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Management**

Davis, CA

FPM 85-2
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Effects of Nalco-Trol on Atomization

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FPM 85-2

EFFECTS OF NALCO-TROL ON ATOMIZATION

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PREFACE

The purpose of this wind tunnel test was to establish drop size characteristics of an 8006 and a D8-46 nozzle atomizing water and Nalco-Trol. Results will be used by the USDA Forest Service in developing prescriptions for applying pesticides, and in selecting nozzle types and position on spray booms. Data are used also as input to mathematical models which predict spray coverage, canopy penetration, and off-target drift. Wind tunnel tests help to provide these data to achieve optimum droplet spectra and application rates.

Funding was provided by USDA Forest Service, Forest Pest Management, Washington Office. Questions and comments should be directed to the Project Officer, John W. Barry, 2810 Chiles Rd., Davis, CA 95616, (916) 758-4600.

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INTRODUCTION:

A series of tests were conducted in a wind tunnel to measure the effect of Nalco-Trol adjuvant on the drop spectra from fan and cone nozzles that are commonly used on fixed wing and helicopter application of pesticides.

Equipment and Materials:

The nozzles were tested in a wind tunnel with a test section 8 ft. long and a 2x2 ft. cross-section. A Particle Measuring System laser probe (PMS OAP-2D-GA1) with a digital data acquisition system (PMS 11-C) was used to count and classify the drops into 62 size classes from 28 μm to 2062 μm. Five different concentrations (0, 3, 6, 9, 12 oz. per 100 gal H_2O) of the visco-elastic adjuvant Nalco-Trol were used in this study. An 80° flat fan nozzle (Spraying Systems 8006) was selected to represent a typical nozzle used with fixed wing applications. This nozzle was operated at 40 psi, at an angle of 135° (forward and down 45°) relative to the airstream and with an airspeed of 120 mph. A disc and core hollow cone nozzle (Spraying Systems D8-46) was selected to represent a typical nozzle used with helicopter applications. This nozzle was operated at 40 psi at 0° (straight back) relative angle to the airstream and with an airspeed of 50 mph.

Procedures:

The PMS software used for this series of tests was Version 123 with AVG set at 100. This version was helpful in obtaining an average weighting factor for each 100 drops measured. The slice rate was adjusted to give a minimum of 2 slices for the smallest detectable particle which was 4 MHz at 120 MPH and 1.5 MHz at 50 MPH. The horizontal distance from the laser beam to nozzle and gap width of laser beam was adjusted for each run to obtain an optimum spray sample density. The horizontal distance ranged from 12 to 75 inches (30 to

191 cm) from the nozzle and the sample gap ranged from 0.4 inches to 0.8 inches. The nozzle was mounted on an automatic x-y scanner which moved the nozzle through a series of parallel vertical passes. The system was controlled with a microprocessor and the length, width, and number of passes were adjusted to sample the entire spray pattern. The length of traverse was 15 inches with a spacing of 1 to 2 inches and a total number of 6 to 12 traverses. Each test was replicated two or more times.

Results:

Table 1 contains a summary of the drop size spectrums for the various concentrations of Nalco-Trol, nozzles, and test conditions. The nomenclature used is as follows:

$\bar{D}_{30}$ = Volume mean diameter

$D_{V.1}$ = Diameter that contains 10% of volume in drops of smaller size

$D_{V.5}$ = Diameter that contains 50% of volume in drops of smaller size. Also defined as volume median diameter.

$D_{V.9}$ = Diameter that contains 90% volume in drops of smaller size.

$D_{V.9} - D_{V.1}$ = Range. This represents the range in drop size that contains 80% of the spray volume.

$\frac{D_{V.9} - D_{V.1}}{D_{V.5}}$ = Relative Span. This is an index that indicates the relative uniformity of drop spectra. The number represents a normalized value of the Range ($D_{V.9} - D_{V.1}$) as a fraction of the volume median diameter. Thus, a smaller number indicates a smaller relative range and a more uniform drop spectra.

8006 Nozzle:

The addition of Nalco-Trol produced a significant affect on the drop size spectrum from the 8006 nozzle positioned at 135° (forward and down 45°) rela-

tive to a 120 mph airstream. The general affect of Nalco-Trol on the drop size spectrum characteristics are shown in Appendix A, pages 15 through 22. The mass frequency histograms clearly show the development of a wider, bi-modal distribution with an increase in Nalco-Trol. Table 1 provides a summary of the drop spectra statistics for all the tests with the 8006 nozzle. As shown, the addition of Nalco-Trol increased the $D_{V.5}$ from 175 to 628 μm. In addition, all tests with Nalco-Trol produced a wider drop size spectrum with a Relative Span of 1.2 to 1.89 compared to the water test with 0.9. The percent volume in drops less than 154 μm decreased from 37 to 9% as the amount of Nalco-Trol was increased from 0 to 12 oz/100 gal water.

Fig 1 illustrates the affect of Nalco-Trol on both the Range and volume median diameter ($D_{V.5}$). As shown, the increase in Nalco-Trol produces a significant increase in the largest drops produced ($D_{V.9}$) and an increase in the volume median diameter ($D_{V.5}$). However, Fig 1 clearly shows a small change in fine drops ($D_{V.1}$) and a large increase in the range of drop size produced ($D_{V.9} - D_{V.1}$) with an increase in Nalco-Trol.

Fig 2 provides a plot of the cumulative drop size distribution of all the tests with the 8006 nozzle. This plot shows the range of drop size and is useful to estimate the percent volume of spray that is in drops less than a desired size. For example, the curves can be used to estimate the percent volume in drops less than 100 μm.

D8-46:

The addition of Nalco-Trol produced a significant affect on the drop size spectrum from a D8-46 nozzle positioned at 0° (straight back) relative to a 50 mph airstream. The general affect of Nalco-Trol on the drop size spectrum is shown in Appendix A, pages 26 through 37. The mass frequency histograms

clearly show an increase in the maximum size drop produced with an increase in Nalco-Trol. For example, the above nozzle produced a maximum drop diameter of 1370 μm with water and increased to 2063 μm with 9 oz of Nalco-Trol per 100 gal.

Table 1 provides a summary of the drop spectra statistics for the tests with the D8-46 nozzle. As shown, the addition of Nalco-Trol increased the $D_{V.5}$ from 501 to 1150 μm. One major attribute for the use of Nalco-Trol in this series of tests was the significant reduction in percent of fine particles with an increase in Nalco-Trol. The percent volume <154 μm was very low and decreased from 2.5 to 0.25% as the Nalco-Trol was increased to 12 oz/100 gal water. However, one should be cautious in the use at the highest concentrations because the very large drops may result in poor coverage of the target. Also, the drop size spectra for the high concentrations were approaching the upper limit of the probe (2062 μm). Thus, since the probe would reject all particles >2062 μm, the $D_{V.5}$ and $D_{V.9}$ for tests with 9 and 12 oz of Nalco-Trol may be somewhat larger than reported in Table 1.

Fig 3 illustrates the general affect of Nalco-Trol on drop size and uniformity of drop size spectrum. As shown, an increase in Nalco-Trol produced a general increase in $D_{V.9}$, $D_{V.5}$, $D_{V.1}$. Also the graph illustrates that the Range ($D_{V.9}$ - $D_{V.1}$) generally increased with an increase in Nalco-Trol.

Fig 4 provides a plot of the cumulative drop size distribution for the tests with the D8-46 nozzle. The graph shows the range of drop size and is useful to estimate the percent spray below a desired drop size.

It should be mentioned that changes in nozzle type and orientation is an alternative way of producing larger drops and a lower % volume <154 μm. For example, other low velocity jets, narrow angle fans, or low velocity cone nozzles may produce a similar drop size spectrum.

Appendix A:

This appendix contains the statistical data and graphs of the drop spectrum for each of 5 tests with the 8006 nozzle and 5 tests with the D8-46 nozzle.

Summary:

A series of tests were conducted to measure the affect of Nalco-Trol on the drop size spectra from an 8006 flat fan nozzle positioned at a 135° (45° forward and down) angle relative to a 120 mph airstream. An increase in Nalco-Trol produced the following:

1. A substantial increase in the maximum size of drops produced; from 512 to 1568 μm.
2. A bi-modal volume frequency drop size distribution.
3. A large increase in the Range ($D_{V.9} - D_{V.1}$); from 158 to 752 μm.
4. A very large increase in Relative Span; 0.9 to 1.89.
5. A large increase in $D_{V.5}$; from 175 to 628 μm.
6. A relatively small increase in $D_{V.1}$; from 100 to 164 μm.
7. The % volume <154 μm decreased from 37 to 9%.

Another series of tests were conducted with a D8-46 hollow cone nozzle directed at 0° (back) relative to the 50 mph airstream. An increase in Nalco-Trol produced the following:

1. An increase in maximum drop size; from 1400 to 2130 μm.
2. An increase in Range ($D_{V.9} - D_{V.1}$); from 660 to 1250 μm.
3. An increase in $D_{V.5}$; from 501 to 1150 μm.
4. An increase in $D_{V.1}$; from 245 to 545 μm.
5. A decrease in % volume <154 μm; from 2.46 to 0.25%.

Table 1
Summary of Drop Size Statistics of 40 psi

Nozzle Type	Oz. of Nalco-Trol Per 100 Gal Water	Flow Rate gpm	Nozzle Angle Relative to Airstream	Air Velocity mph	$\bar{D}_{30}$ µm	$D_{V.1}$ µm	$D_{V.5}$ µm	$D_{V.9}$ µm	Relative Span	Volume <154 µm %
8006	0	0.61	135°	120	117	100	175	258	0.90	37
	3	0.63	135°	120	121	105	258	553	1.74	25
	6	0.63	135°	120	136	119	302	691	1.89	19
	9	0.63	135°	120	156	138	407	799	1.62	13
	12	0.63	135°	120	180	164	628	916	1.20	9
D8-46	0	1.84	0°	50	239	245	501	903	1.31	2.46
	3	1.38	0°	50	303	309	714	1140	1.16	1.35
	6	1.38	0°	50	350	374	873	1443	1.23	0.87
	9	1.38	0°	50	437	457	1099	1759	1.18	0.42
	12	1.38	0°	50	515	548	1150	1801	1.09	0.25

Figure 1

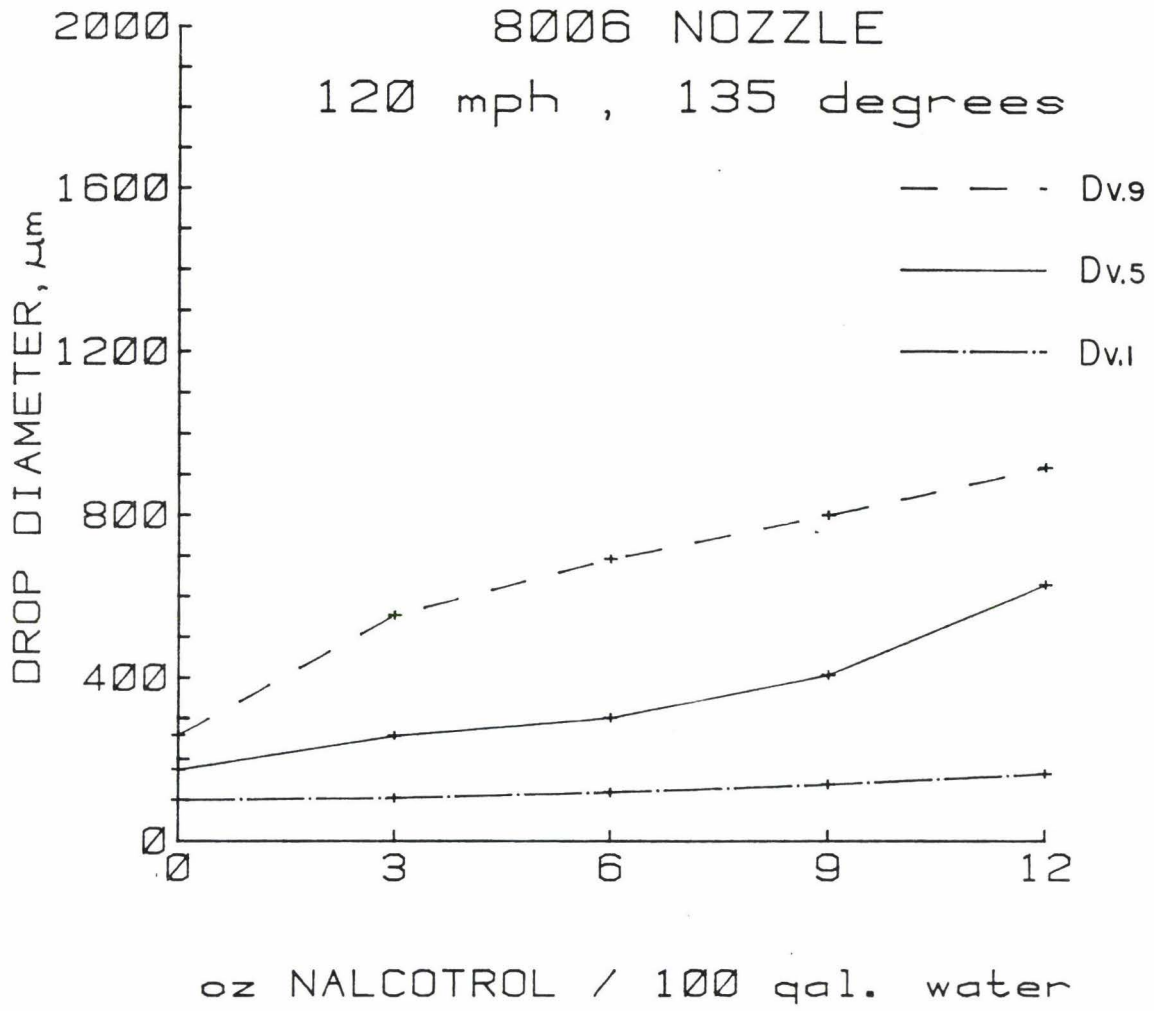

8006 NOZZLE
120 mph , 135 degrees
Dv.9
Dv.5
Dv.1
DROP DIAMETER, µm
2000
1600
1200
800
400
0
0
3
6
9
12
oz NALCOTROL / 100 gal. water

Figure 2

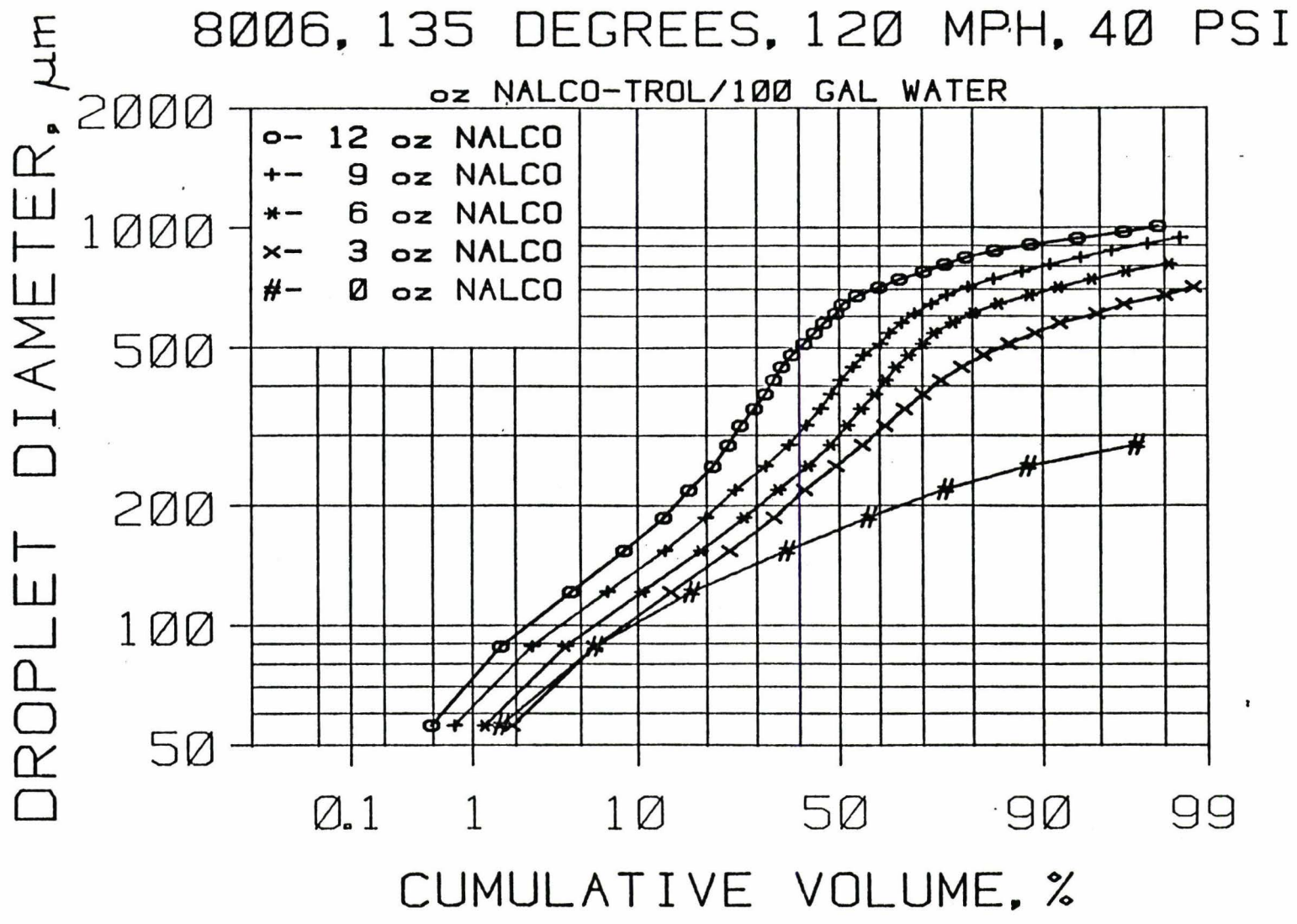

8006, 135 DEGREES, 120 MPH, 40 PSI
oz NALCO-TROL/100 GAL WATER
o- 12 oz NALCO
+- 9 oz NALCO
*- 6 oz NALCO
x- 3 oz NALCO
#- 0 oz NALCO
DROPLET DIAMETER, µm
2000
1000
500
200
100
50
0.1
1
10
50
90
99
CUMULATIVE VOLUME, %

Figure 3

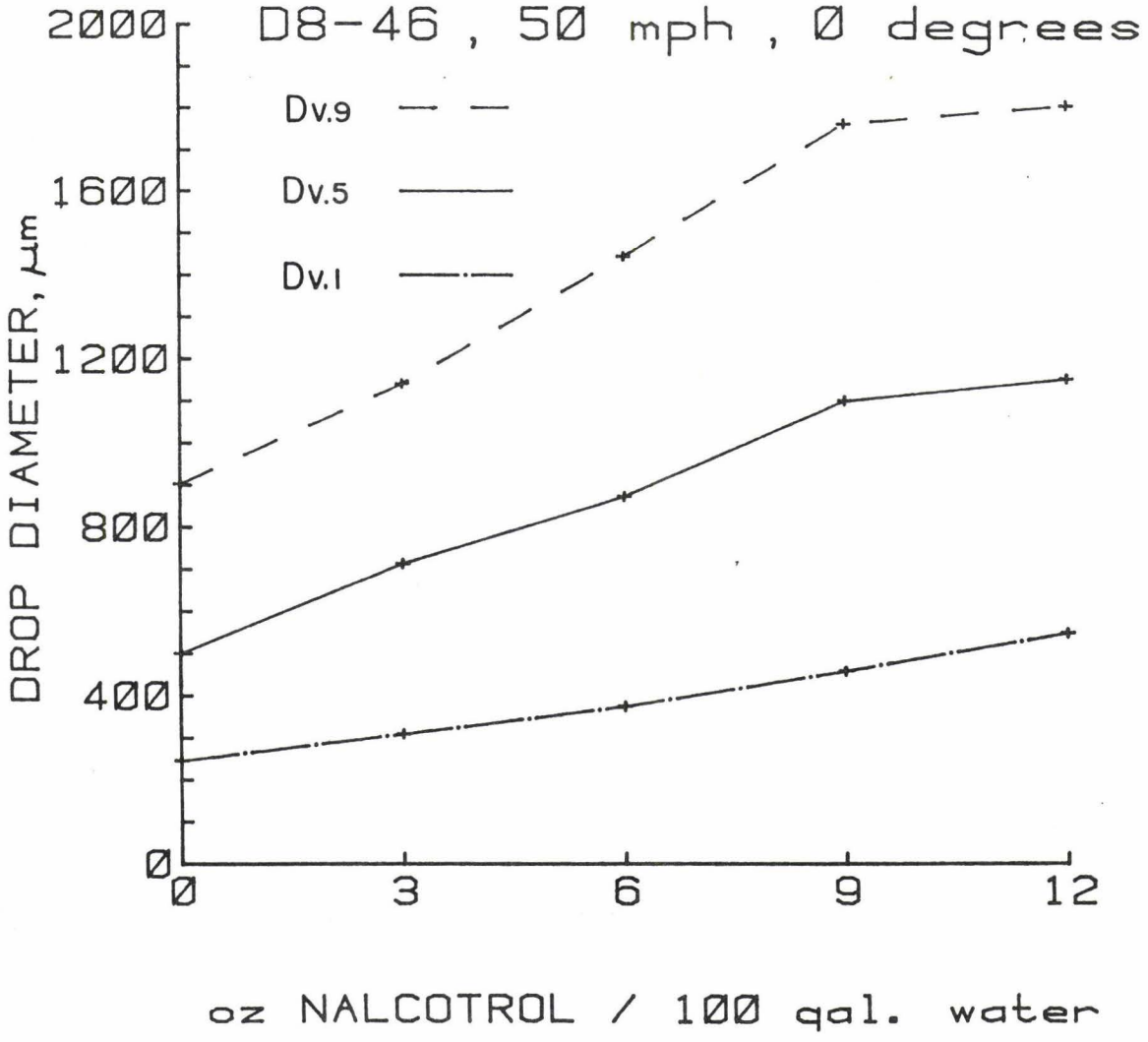
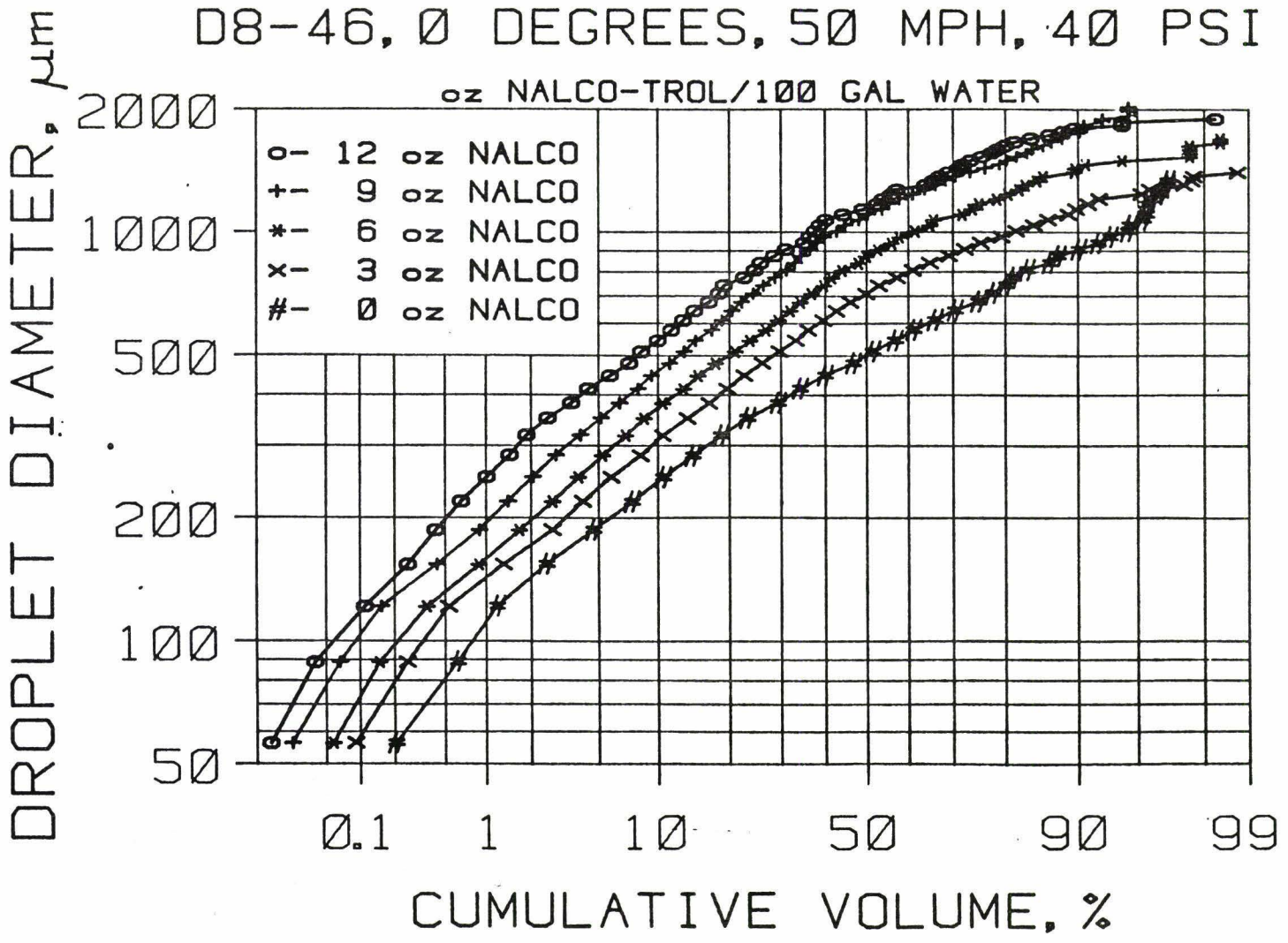

D8-46 , 50 mph , 0 degrees
Dv.9
Dv.5
Dv.1
DROP DIAMETER, µm
2000
1600
1200
800
400
0
0
3
6
9
12
oz NALCOTROL / 100 gal. water

Figure 4


D8-46, 0 DEGREES, 50 MPH, 40 PSI
oz NALCO-TROL/100 GAL WATER
o- 12 oz NALCO
+- 9 oz NALCO
*- 6 oz NALCO
x- 3 oz NALCO
#- 0 oz NALCO
DROPLET DIAMETER, µm
2000
1000
500
200
100
50
0.1
1
10
50
90
99
CUMULATIVE VOLUME, %

8006,135 Degrees,40 psi,120 mph,WATER

DTG 84/08/23 11:28:00

DFM=1.0--4.0 MHz

UPPER LIMIT	N(RAW)	N/SEC	gm/SEC	% N	% VOL.	ACCUMULATED % N	ACCUMULATED % VOL.
56	1103	1.35E 07	0.44	41.03	1.61	41.03	1.61
89	1798	6.18E 06	1.23	18.76	4.44	59.79	6.05
122	1798	5.21E 06	3.16	15.81	11.44	75.60	17.49
154	1800	3.85E 06	5.27	11.70	19.05	87.30	36.54
187	1708	2.25E 06	5.81	6.82	21.02	94.12	57.56
219	1312	1.11E 06	4.83	3.36	17.48	97.47	75.04
252	1088	544626	3.71	1.65	13.42	99.13	88.46
284	609	235628	2.37	0.72	8.56	99.84	97.02
318	162	43338	0.62	0.13	2.25	99.97	99.27
351	31	3764	0.07	0.01	0.27	99.99	99.54
382	18	3787	0.10	0.01	0.35	100.00	99.88
414	5	504	0.02	0.00	0.06	100.00	99.94
447	3	224	0.01	0.00	0.03	100.00	99.98
479	1	59	0.00	0.00	0.01	100.00	99.99
512	1	44	0.00	0.00	0.01	100.00	100.00
545	0	0	0.00	0.00	0.00	100.00	100.00
TOTALS		3.29E 07	27.66				

TOTAL RAW PARTICLES.... 11437/13949-- 81.99%

NUMBER MEAN DIAMETER... 87.37 MICROMETERS S.D.... 53.96

VOLUME MEAN DIAMETER... 117.09 MICROMETERS S.D.... 145.52

SAUTER MEAN DIAMETER... 152.26 MICROMETERS

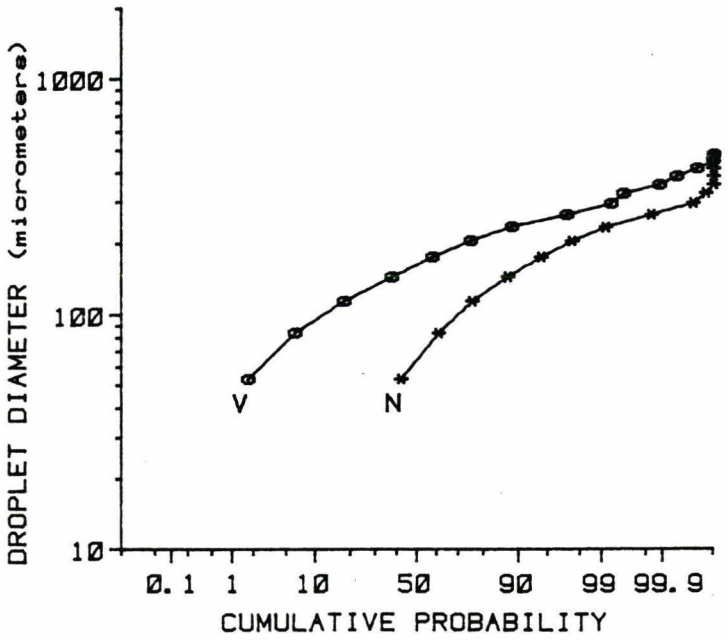
$D_{N0.1}$... 0.00 MICROMETERS $D_{V0.1}$... 100.34 MICROMETERS

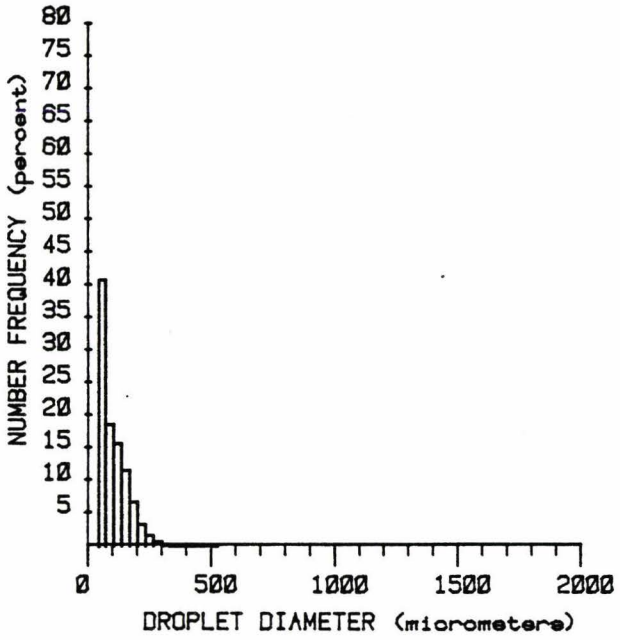
$D_{N0.5}$... 72.04 MICROMETERS $D_{V0.5}$... 175.40 MICROMETERS R.S.... 0.90

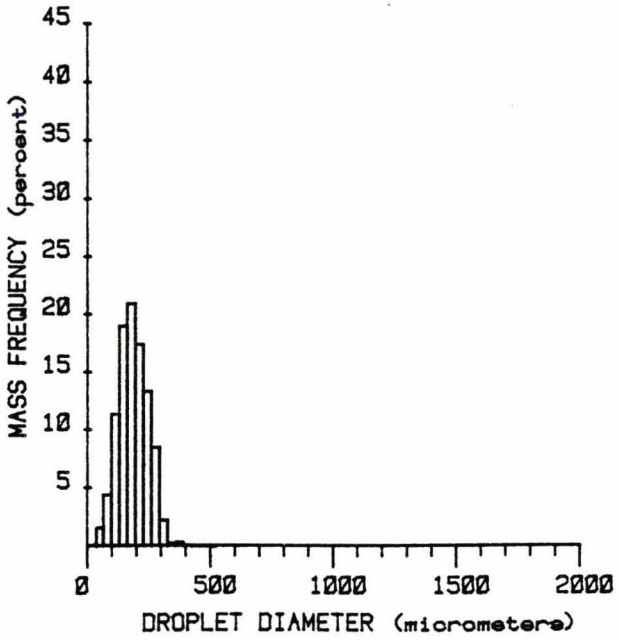
$D_{N0.9}$... 167.34 MICROMETERS $D_{V0.9}$... 257.73 MICROMETERS

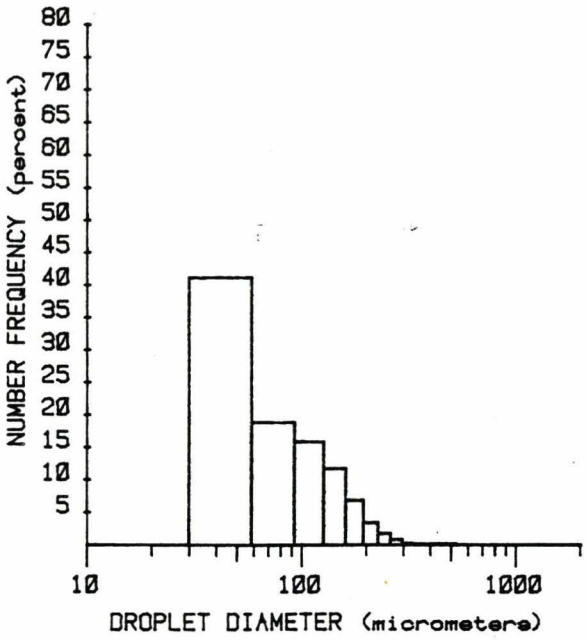
Nozzle Type..... *8006*
Nozzle Angle Rel.
to Airstream..... *135°*
Spray Pressure..... *40 PSI*
Airspeed..... *120 MPH*

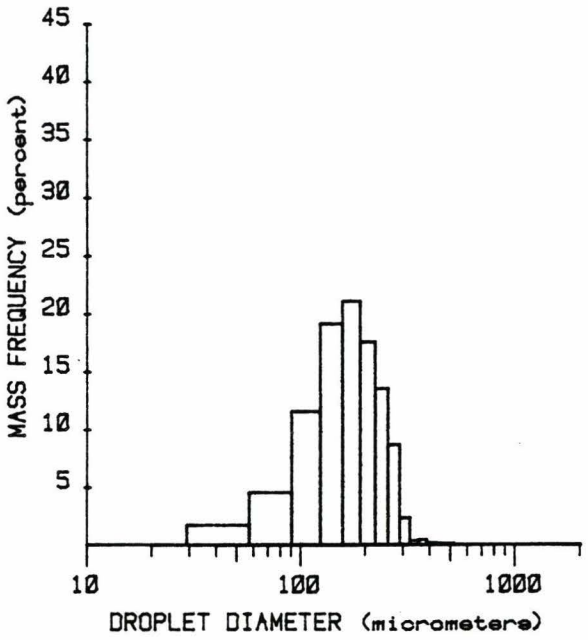
Distance to Probe... *30 cm.*
Depth of Field..... *1.0 cm.*
Slice Rate..... *4.0 MHz*
Date..... *84/08/23*
Time..... *11:28:00*
File Number..... *11.0.33*











8006,135 Degrees,40 psi,120 mph,3 oz Nalco-Trol/100 gal

DTG 84/08/22 14:23:00

DFM=1.0--4.0 MHz

UPPER LIMIT	N(RAW)	N/SEC	qm/SEC	% N	% VOL.	ACCUMULATED % N	ACCUMULATED % VOL.
56	2680	1.87E 07	0.61	53.60	1.91	53.60	1.91
89	5134	6.70E 06	1.33	19.25	4.14	72.86	6.05
122	3853	4.36E 06	2.65	12.54	8.24	85.39	14.30
154	3155	2.41E 06	3.30	6.92	10.25	92.31	24.55
187	2245	1.13E 06	2.94	3.26	9.14	95.57	33.68
219	1548	529248	2.31	1.52	7.20	97.09	40.88
252	1492	369760	2.52	1.06	7.83	98.15	48.71
284	1256	237096	2.38	0.68	7.41	98.84	56.12
318	876	122072	1.75	0.35	5.46	99.19	61.58
351	609	76128	1.49	0.22	4.63	99.40	66.21
382	422	53235	1.36	0.15	4.23	99.56	70.44
414	364	37624	1.24	0.11	3.85	99.67	74.29
447	309	32101	1.34	0.09	4.16	99.76	78.45
479	237	22031	1.14	0.06	3.55	99.82	82.00
512	231	20630	1.31	0.06	4.08	99.88	86.08
545	162	13710	1.06	0.04	3.28	99.92	89.37
578	115	8806	0.81	0.03	2.53	99.95	91.90
611	86	8594	0.94	0.02	2.93	99.97	94.83
644	56	4077	0.53	0.01	1.63	99.98	96.46
677	42	3492	0.53	0.01	1.63	99.99	98.09
710	17	1281	0.22	0.00	0.69	100.00	98.79
743	10	780	0.16	0.00	0.49	100.00	99.27
776	5	369	0.08	0.00	0.26	100.00	99.53
809	3	337	0.09	0.00	0.27	100.00	99.81
842	2	142	0.04	0.00	0.13	100.00	99.94
875	1	62	0.02	0.00	0.06	100.00	100.00
908	0	0	0.00	0.00	0.00	100.00	100.00
TOTALS		3.48E 07	32.15				

TOTAL RAW PARTICLES.... 24910/31317-- 79.54%

NUMBER MEAN DIAMETER... 75.40 MICROMETERS S.D.... 57.66

VOLUME MEAN DIAMETER... 120.87 MICROMETERS S.D.... 213.47

SAUTER MEAN DIAMETER... 196.02 MICROMETERS

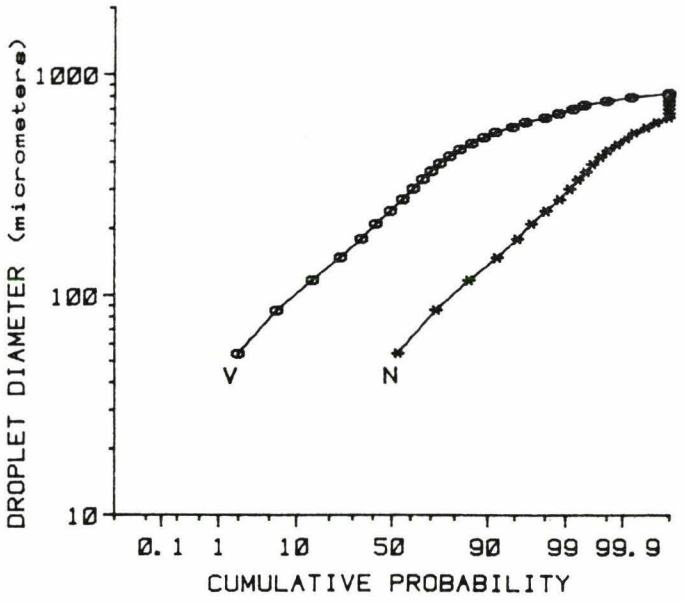
$D_{N0.1}$... 0.00 MICROMETERS $D_{V0.1}$... 104.74 MICROMETERS

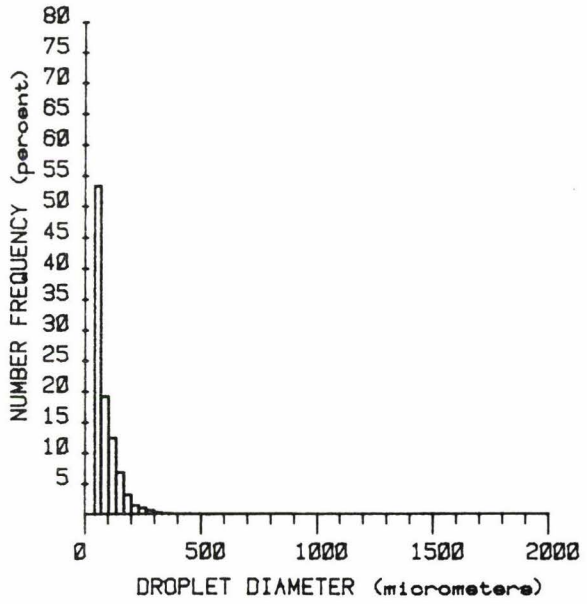
$D_{N0.5}$... 0.00 MICROMETERS $D_{V0.5}$... 257.52 MICROMETERS R.S.... 1.74

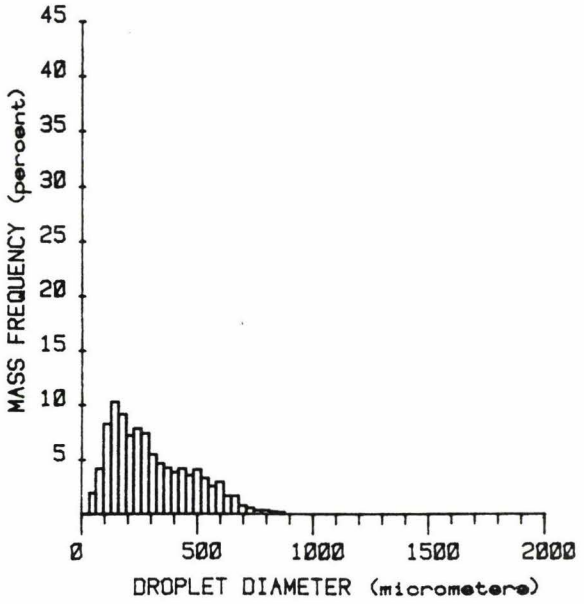
$D_{N0.9}$... 143.57 MICROMETERS $D_{V0.9}$... 552.77 MICROMETERS

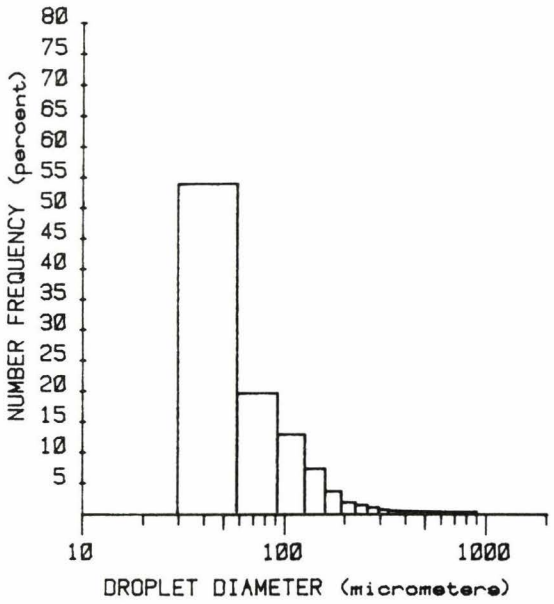
Nozzle Type..... *8006*
Nozzle Angle Rel.
to Airstream..... *135°*
Spray Pressure..... *40 PSI*
Airspeed..... *120 MPH*

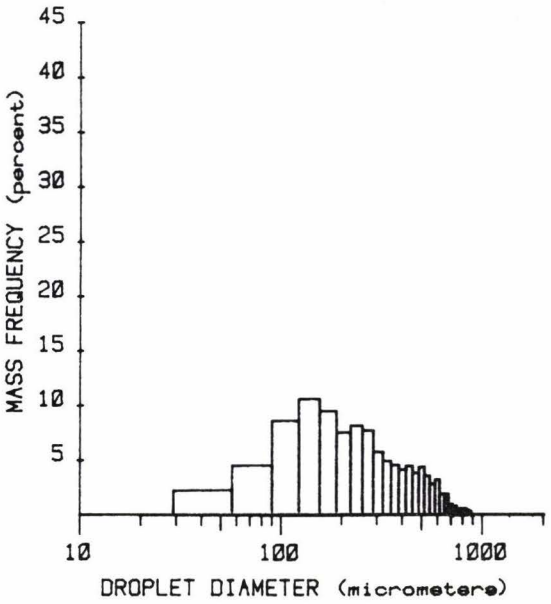
Distance to Probe... *30 cm.*
Depth of Field..... *1.0 cm.*
Slice Rate..... *4.0 MHz*
Date..... *84/08/22*
Time..... *14:23:00*
File Number..... *11.0.29*











8006,135 Degrees,40 psi,120 mph,6 oz Nalco-Trol/100 gal

DTG 84/08/22 14:53:00

DFM=1.0--4.0 MHz

UPPER LIMIT	N(RAW)	N/SEC	qm/SEC	% N	% VOL.	ACCUMULATED % N	ACCUMULATED % VOL.
56	2243	1.51E 07	0.50	49.15	1.24	49.15	1.24
89	5502	5.82E 06	1.16	19.00	2.89	68.15	4.13
122	4343	4.22E 06	2.56	13.76	6.39	81.91	10.52
154	2970	2.52E 06	3.44	8.22	8.60	90.12	19.12
187	1877	1.28E 06	3.31	4.17	8.27	94.29	27.39
219	1347	659494	2.88	2.15	7.20	96.44	34.60
252	1267	419424	2.86	1.37	7.14	97.81	41.73
284	973	223394	2.24	0.73	5.60	98.54	47.34
318	710	136153	1.96	0.44	4.89	98.99	52.23
351	480	71718	1.40	0.23	3.50	99.22	55.73
382	379	53679	1.37	0.18	3.42	99.40	59.15
414	296	31357	1.03	0.10	2.58	99.50	61.73
447	242	23645	0.99	0.08	2.46	99.58	64.19
479	241	22429	1.16	0.07	2.90	99.65	67.10
512	197	16752	1.06	0.05	2.66	99.70	69.76
545	195	16512	1.27	0.05	3.18	99.76	72.93
578	213	16266	1.50	0.05	3.75	99.81	76.69
611	191	12934	1.42	0.04	3.54	99.85	80.23
644	186	12774	1.65	0.04	4.11	99.89	84.34
677	141	11313	1.70	0.04	4.25	99.93	88.59
710	112	7278	1.27	0.02	3.16	99.95	91.75
743	87	5543	1.11	0.02	2.77	99.97	94.52
776	56	3563	0.81	0.01	2.04	99.98	96.56
809	37	2498	0.65	0.01	1.62	99.99	98.18
842	21	1440	0.42	0.00	1.06	100.00	99.24
875	7	664	0.22	0.00	0.55	100.00	99.78
908	3	172	0.06	0.00	0.16	100.00	99.94
941	1	54	0.02	0.00	0.06	100.00	100.00
974	0	0	0.00	0.00	0.00	100.00	100.00
TOTALS		3.06E 07	40.04				

TOTAL RAW PARTICLES.... 24317/31063-- 78.28%

NUMBER MEAN DIAMETER... 81.70 MICROMETERS S.D.... 65.00

VOLUME MEAN DIAMETER... 135.68 MICROMETERS S.D.... 252.99

SAUTER MEAN DIAMETER... 229.15 MICROMETERS

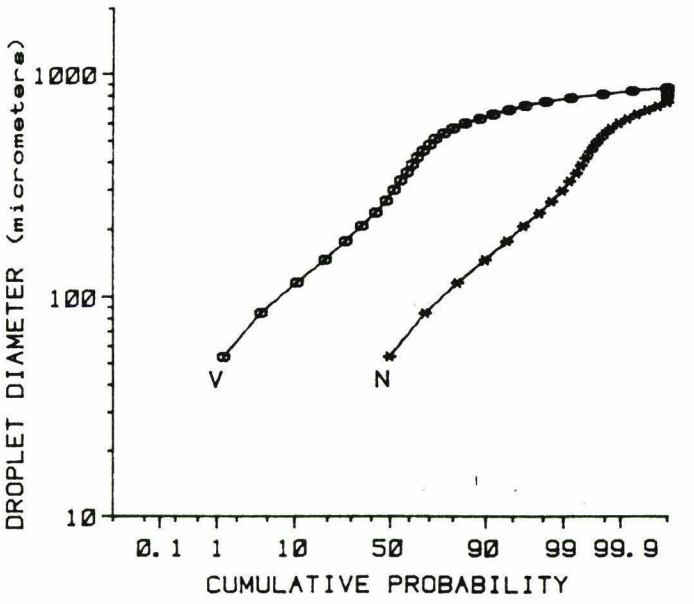
$D_{N0.1}$... 0.00 MICROMETERS $D_{V0.1}$... 119.24 MICROMETERS

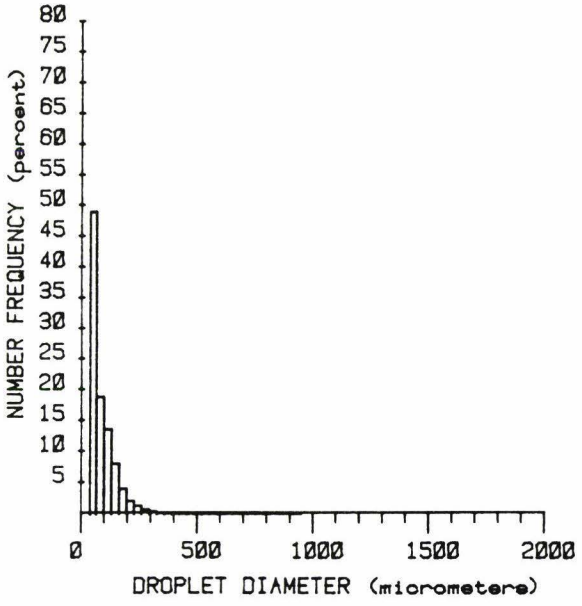
$D_{N0.5}$... 57.74 MICROMETERS $D_{V0.5}$... 302.26 MICROMETERS R.S.... 1.89

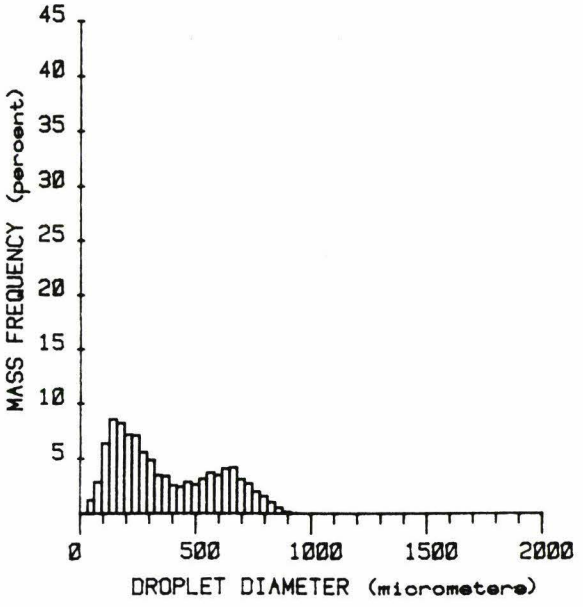
$D_{N0.9}$... 154.12 MICROMETERS $D_{V0.9}$... 691.21 MICROMETERS

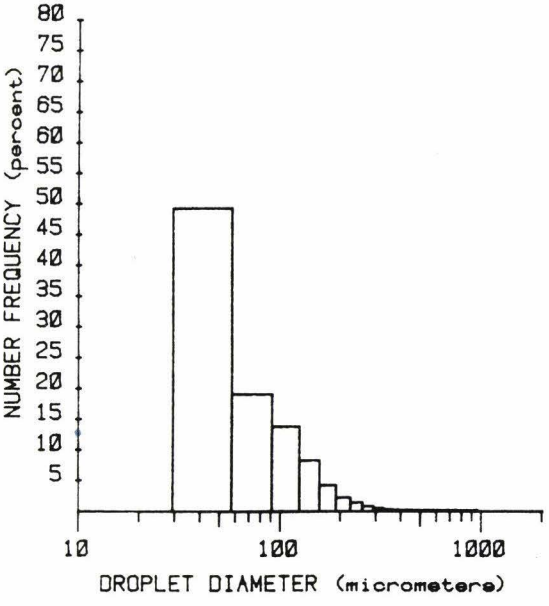
Nozzle Type..... *8006*
Nozzle Angle Rel.
to Airstream..... *135°*
Spray Pressure..... *40 PSI*
Airspeed..... *120 MPH*

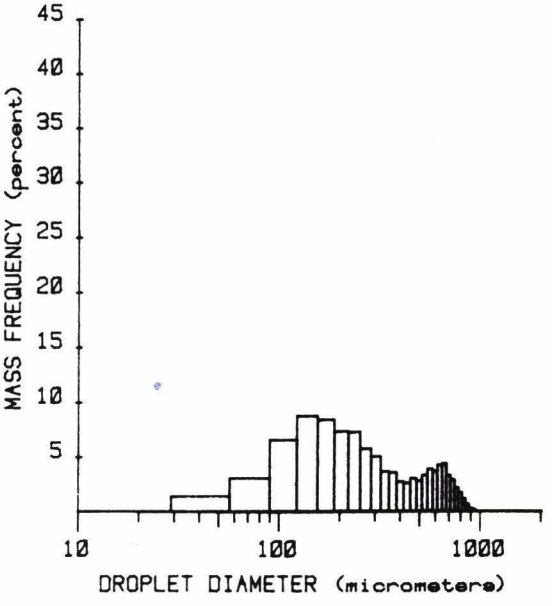
Distance to Probe... *30 cm.*
Depth of Field..... *1.0 cm.*
Slice Rate..... *4.0 MHz*
Date..... *84/08/22*
Time..... *14:53:00*
File Number..... *11.0.30*











8006,135 Degrees,40 psi,120 mph,9 oz Nalco-Trol/100 gal

DTG 84/08/22 16:16:00

DFM=1.0--4.0 MHz

UPPER LIMIT	N(RAW)	N/SEC	gm/SEC	% N	% VOL.	ACCUMULATED % N	ACCUMULATED % VOL.
56	4769	1.14E 07	0.38	45.34	0.75	45.34	0.75
89	13043	4.69E 06	0.93	18.57	1.85	63.91	2.60
122	11339	3.58E 06	2.17	14.18	4.32	78.09	6.92
154	7232	2.32E 06	3.18	9.21	6.32	87.30	13.25
187	3967	1.24E 06	3.21	4.91	6.38	92.21	19.63
219	2589	697128	3.05	2.76	6.06	94.97	25.69
252	2067	450504	3.07	1.78	6.10	96.75	31.80
284	1569	270862	2.72	1.07	5.41	97.82	37.21
318	1074	144310	2.07	0.57	4.13	98.40	41.34
351	793	91228	1.78	0.36	3.55	98.76	44.89
382	614	52596	1.34	0.21	2.67	98.97	47.56
414	454	48283	1.59	0.19	3.16	99.16	50.72
447	423	36658	1.53	0.15	3.04	99.30	53.76
479	363	25531	1.32	0.10	2.63	99.40	56.39
512	335	26857	1.71	0.11	3.40	99.51	59.79
545	322	18491	1.42	0.07	2.83	99.58	62.62
578	289	16071	1.48	0.06	2.95	99.65	65.57
611	279	13818	1.51	0.05	3.01	99.70	68.58
644	284	13742	1.77	0.05	3.52	99.76	72.11
677	269	11432	1.72	0.05	3.42	99.80	75.53
710	277	11319	1.97	0.04	3.92	99.85	79.45
743	273	10701	2.14	0.04	4.26	99.89	83.71
776	204	8914	2.04	0.04	4.05	99.92	87.76
809	165	6100	1.58	0.02	3.15	99.95	90.91
842	126	4850	1.42	0.02	2.83	99.97	93.75
875	78	3186	1.05	0.01	2.09	99.98	95.84
908	52	2271	0.84	0.01	1.67	99.99	97.51
941	23	1171	0.48	0.00	0.96	99.99	98.47
974	21	1098	0.50	0.00	1.00	100.00	99.47
1007	4	147	0.07	0.00	0.15	100.00	99.62
1040	3	96	0.05	0.00	0.11	100.00	99.73
1073	1	31	0.02	0.00	0.04	100.00	99.77
1106	2	60	0.04	0.00	0.08	100.00	99.85
1139	2	69	0.05	0.00	0.10	100.00	99.95
1172	1	32	0.03	0.00	0.05	100.00	100.00
1205	0	0	0.00	0.00	0.00	100.00	100.00
TOTALS		2.52E 07	50.27				

TOTAL RAW PARTICLES.... 53306/69852-- 76.31%

NUMBER MEAN DIAMETER... 89.43 MICROMETERS S.D.... 76.01

VOLUME MEAN DIAMETER... 156.16 MICROMETERS S.D.... 295.41

SAUTER MEAN DIAMETER... 276.43 MICROMETERS

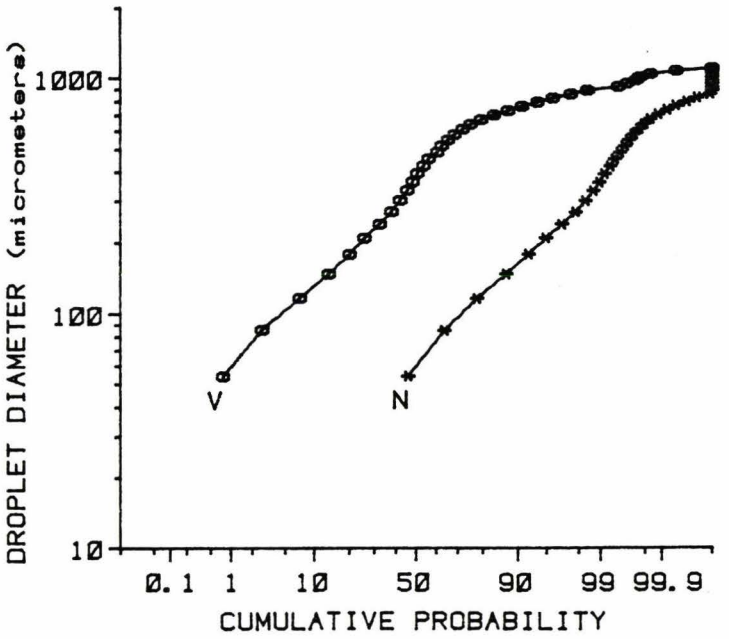
$D_{N0.1}$... 0.00 MICROMETERS $D_{V0.1}$... 137.65 MICROMETERS

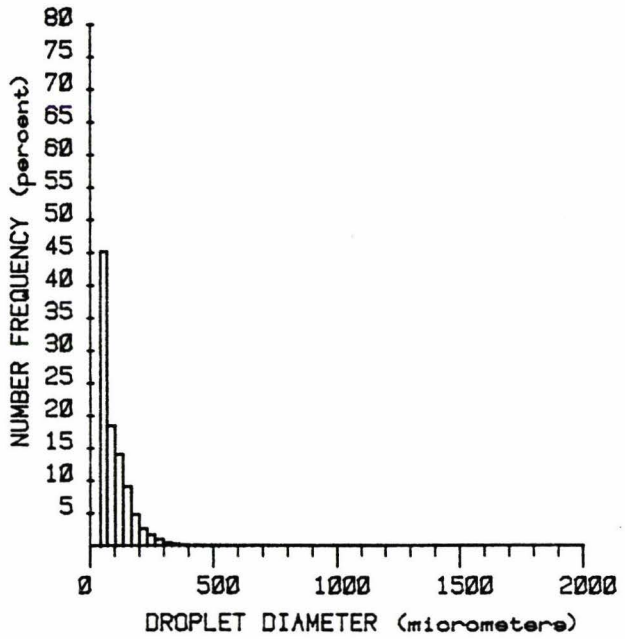
$D_{N0.5}$... 64.54 MICROMETERS $D_{V0.5}$... 407.46 MICROMETERS R.S.... 1.62

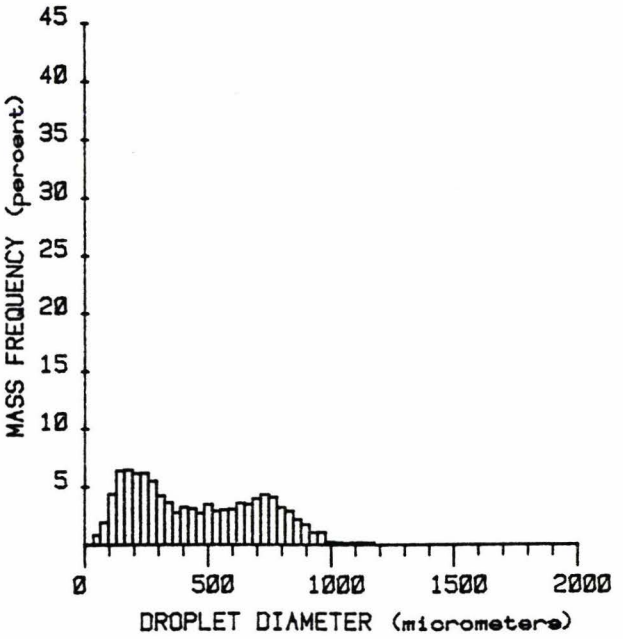
$D_{N0.9}$... 172.45 MICROMETERS $D_{V0.9}$... 798.94 MICROMETERS

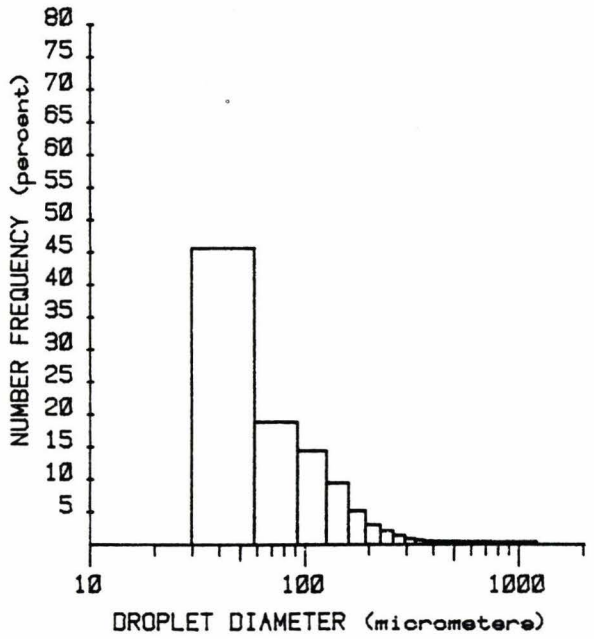
Nozzle Type..... *8006*
Nozzle Angle Rel.
to Airstream..... *135°*
Spray Pressure..... *40 PSI*
Airspeed..... *120 MPH*

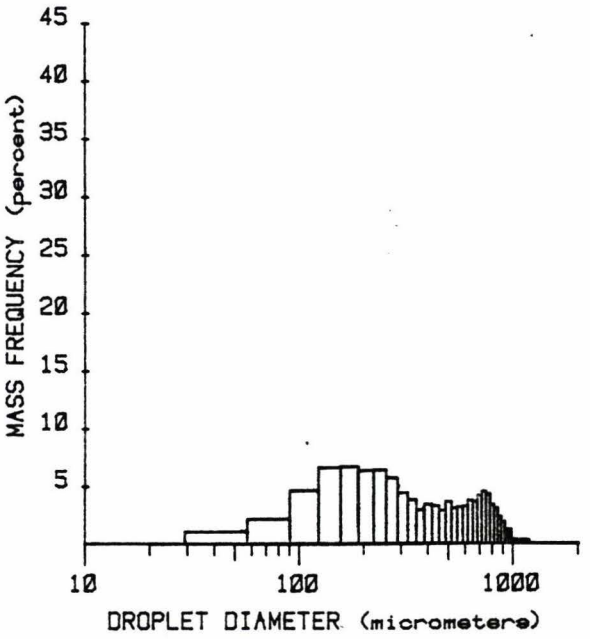
Distance to Probe... *30 cm.*
Depth of Field..... *1.0 cm.*
Slice Rate..... *4.0 MHz*
Date..... *84/08/22*
Time..... *16:16:00*
File Number..... *11.0.31*











8006,135 Degrees,40 psi,120 mph,12 oz Nalco-Trol/100 gal

DTG 84/08/23 10:35:00

DFM=1.0--4.0 MHz

UPPER LIMIT	N(RAW)	N/SEC	gm/SEC	% N	% VOL.	ACCUMULATED % N	ACCUMULATED % VOL.
56	3066	7.24E 06	0.24	46.22	0.50	46.22	0.50
89	7620	2.68E 06	0.53	17.09	1.11	63.31	1.61
122	6746	2.13E 06	1.29	13.59	2.71	76.90	4.32
154	4088	1.52E 06	2.08	9.68	4.34	86.58	8.67
187	1936	810444	2.10	5.17	4.39	91.75	13.06
219	1083	451317	1.97	2.88	4.13	94.63	17.19
252	655	260978	1.78	1.67	3.72	96.29	20.91
284	440	160776	1.61	1.03	3.38	97.32	24.29
318	295	80176	1.15	0.51	2.41	97.83	26.71
351	226	61373	1.20	0.39	2.51	98.22	29.22
382	187	45104	1.15	0.29	2.41	98.51	31.63
414	151	29010	0.96	0.19	2.00	98.70	33.63
447	127	21534	0.90	0.14	1.88	98.83	35.51
479	134	22262	1.15	0.14	2.42	98.98	37.93
512	126	21338	1.36	0.14	2.84	99.11	40.77
545	124	16025	1.23	0.10	2.58	99.21	43.35
578	115	12317	1.14	0.08	2.38	99.29	45.73
611	103	13160	1.44	0.08	3.02	99.38	48.75
644	109	8819	1.14	0.06	2.38	99.43	51.13
677	111	11480	1.73	0.07	3.61	99.51	54.75
710	135	12934	2.25	0.08	4.71	99.59	59.46
743	128	13244	2.65	0.08	5.55	99.67	65.01
776	115	11622	2.66	0.07	5.56	99.75	70.57
809	97	8367	2.17	0.05	4.55	99.80	75.13
842	67	6168	1.81	0.04	3.79	99.84	78.92
875	77	7124	2.35	0.05	4.93	99.89	83.85
908	56	6299	2.33	0.04	4.88	99.93	88.72
941	47	5480	2.26	0.03	4.73	99.96	93.46
974	22	3136	1.44	0.02	3.01	99.98	96.47
1007	11	1291	0.66	0.01	1.37	99.99	97.84
1040	7	1011	0.57	0.01	1.19	100.00	99.03
1073	0	0	0.00	0.00	0.00	100.00	99.03
1106	1	632	0.43	0.00	0.89	100.00	99.92
1139	0	0	0.00	0.00	0.00	100.00	99.92
1172	1	48	0.04	0.00	0.08	100.00	100.00
1205	0	0	0.00	0.00	0.00	100.00	100.00
TOTALS		1.57E 07	47.76				

TOTAL RAW PARTICLES.... 28206/40650-- 69.39%

NUMBER MEAN DIAMETER... 92.54 MICROMETERS S.D.... 38.32

VOLUME MEAN DIAMETER... 179.95 MICROMETERS S.D.... 349.23

SAUTER MEAN DIAMETER... 356.12 MICROMETERS

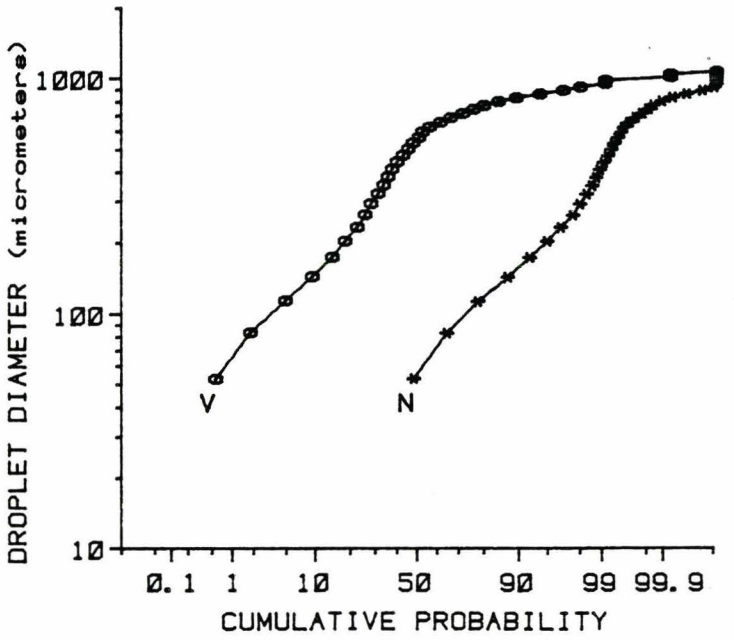
$D_{N0.1}$... 0.00 MICROMETERS $D_{V0.1}$... 164.29 MICROMETERS

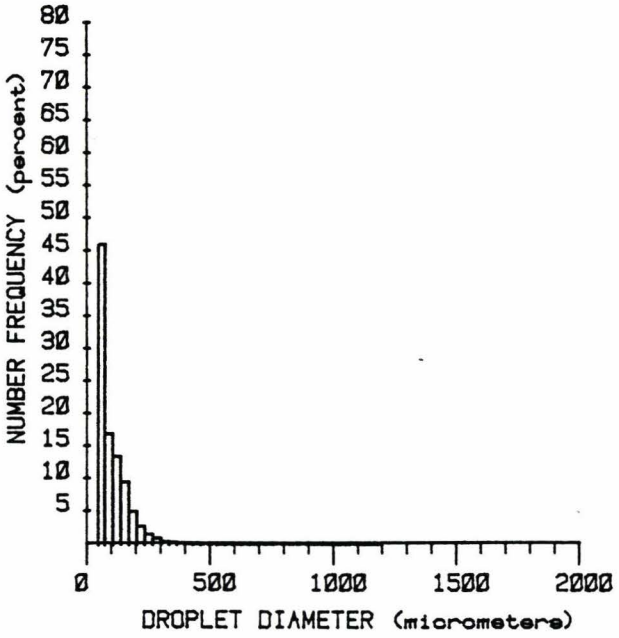
$D_{N0.5}$... 63.57 MICROMETERS $D_{V0.5}$... 627.80 MICROMETERS R.S.... 1.20

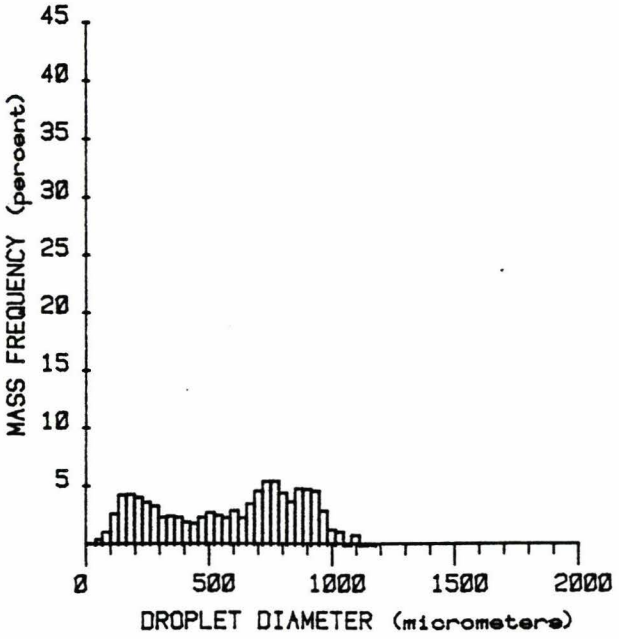
$D_{N0.9}$... 176.11 MICROMETERS $D_{V0.9}$... 916.39 MICROMETERS

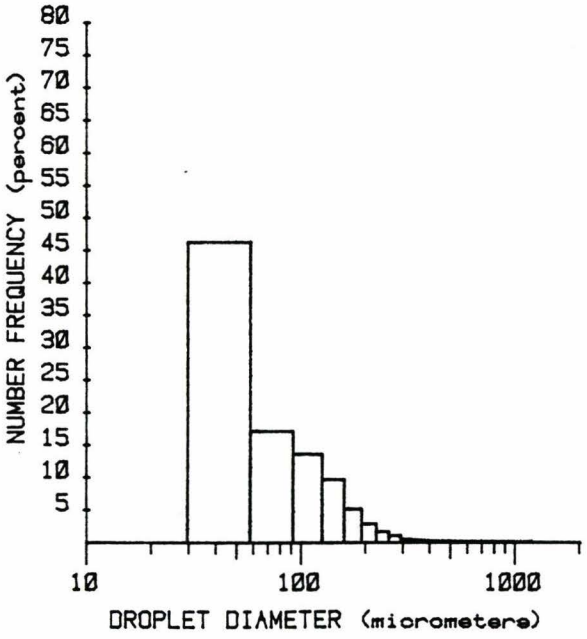
Nozzle Type..... *8006*
Nozzle Angle Rel.
to Airstream..... *135°*
Spray Pressure..... *40 PSI*
Airspeed..... *120 MPH*

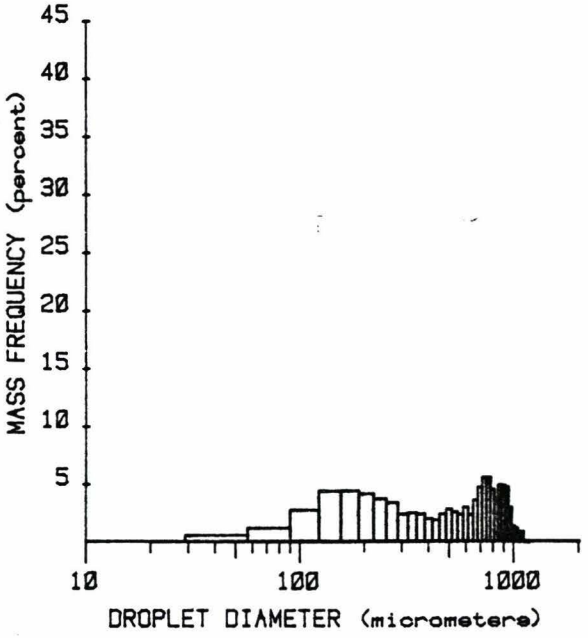
Distance to Probe... *30 cm.*
Depth of Field..... *1.0 cm.*
Slice Rate..... *4.0 MHz*
Date..... *84/08/23*
Time..... *10:35:00*
File Number..... *11.0.32*











D8-46,0 Degrees,40 psi,50 mph,Water

DTG 83/04/14 09:49:11

DFM=2.0--2.0 MHz

UPPER LIMIT	N(RAW)	N/SEC	qm/SEC	% N	% VOL.	ACCUMULATED % N	ACCUMULATED % VOL.
56	2480	7.11E 06	0.23	44.71	0.21	44.71	0.21
89	4900	2.28E 06	0.45	14.34	0.40	59.04	0.61
122	4191	1.05E 06	0.64	6.58	0.56	65.62	1.17
154	3848	1.07E 06	1.46	6.70	1.29	72.32	2.46
187	3014	948596	2.46	5.96	2.17	78.29	4.63
219	2228	717337	3.14	4.51	2.77	82.80	7.41
252	1735	550981	3.75	3.46	3.32	86.26	10.73
284	1501	415550	4.17	2.61	3.69	88.87	14.42
318	1336	346889	4.99	2.18	4.41	91.05	18.83
351	1077	268303	5.25	1.69	4.64	92.74	23.47
382	963	250602	6.40	1.58	5.66	94.32	29.13
414	890	164700	5.42	1.04	4.80	95.35	33.93
447	692	153751	6.41	0.97	5.67	96.32	39.60
479	585	147612	7.65	0.93	6.77	97.25	46.37
512	414	96196	6.11	0.60	5.41	97.85	51.78
545	398	79528	6.12	0.50	5.42	98.35	57.19
578	286	52871	4.88	0.33	4.32	98.68	61.51
611	226	50092	5.49	0.31	4.86	99.00	66.37
644	197	38478	4.96	0.24	4.39	99.24	70.76
677	161	35965	5.41	0.23	4.78	99.47	75.54
710	109	18163	3.16	0.11	2.80	99.58	78.34
743	96	12753	2.55	0.08	2.26	99.66	80.59
776	57	4625	1.06	0.03	0.94	99.69	81.53
809	56	9357	2.43	0.06	2.15	99.75	83.68
842	33	12038	3.54	0.08	3.13	99.83	86.81
875	26	3814	1.26	0.02	1.11	99.85	87.92
908	28	7373	2.73	0.05	2.41	99.90	90.33
941	20	4819	1.99	0.03	1.76	99.93	92.09
974	15	2488	1.14	0.02	1.01	99.94	93.10
1007	11	3072	1.56	0.02	1.38	99.96	94.48
1040	3	234	0.13	0.00	0.12	99.96	94.60
1073	6	1643	1.01	0.01	0.90	99.97	95.49
1106	2	202	0.14	0.00	0.12	99.97	95.61
1139	0	0	0.00	0.00	0.00	99.97	95.61
1172	0	0	0.00	0.00	0.00	99.97	95.61
1205	2	433	0.38	0.00	0.34	99.98	95.95
1238	1	539	0.51	0.00	0.45	99.98	96.40
1271	0	0	0.00	0.00	0.00	99.98	96.40
1304	2	292	0.33	0.00	0.29	99.98	96.69
1337	0	0	0.00	0.00	0.00	99.98	96.69
1370	2	2889	3.74	0.02	3.31	100.00	100.00
1403	0	0	0.00	0.00	0.00	100.00	100.00
TOTALS		1.59E 07	113.05				

D8-46,0 Degrees,40 psi,50 mph,Water

DTG 83/04/14 09:49:11

DFM=2.0--2.0 MHz

TOTAL RAW PARTICLES.... 31591/37167-- 85.00%

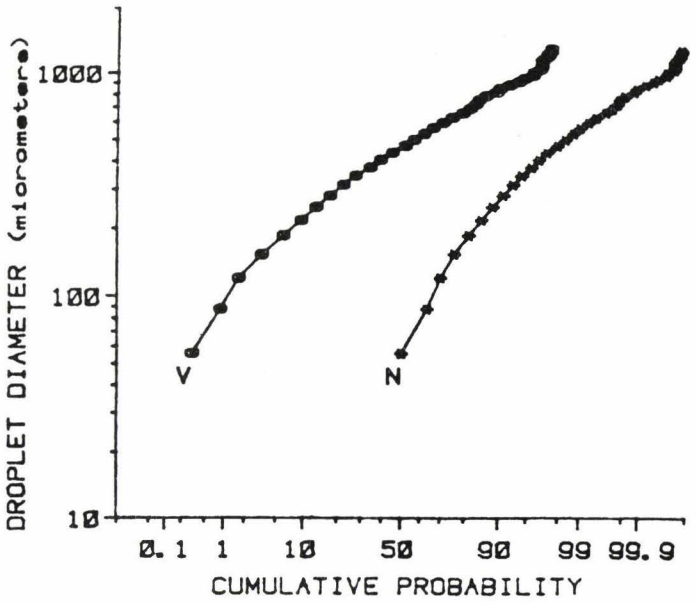
NUMBER MEAN DIAMETER... 126.12 MICROMETERS S.D.... 130.60

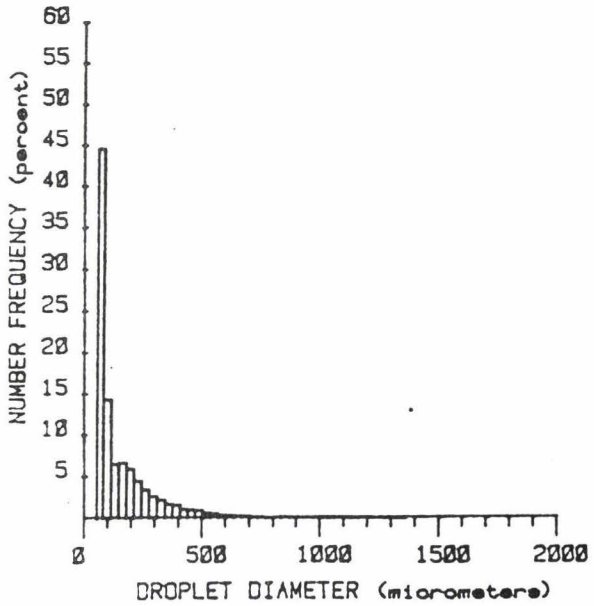
VOLUME MEAN DIAMETER... 238.64 MICROMETERS S.D.... 397.59

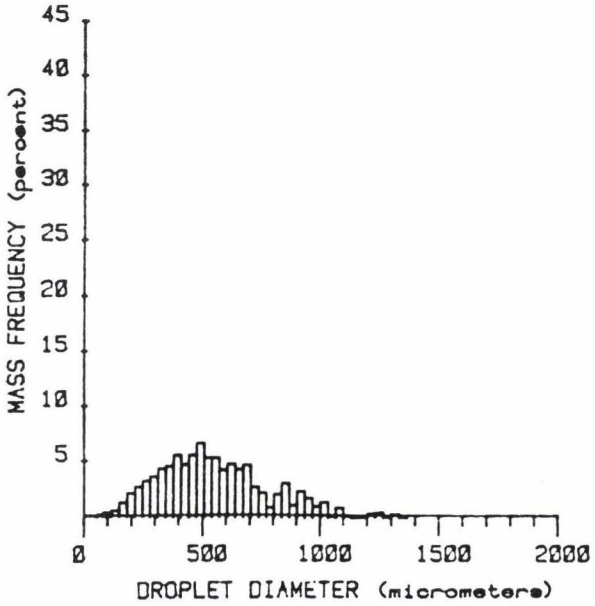
SAUTER MEAN DIAMETER... 412.31 MICROMETERS

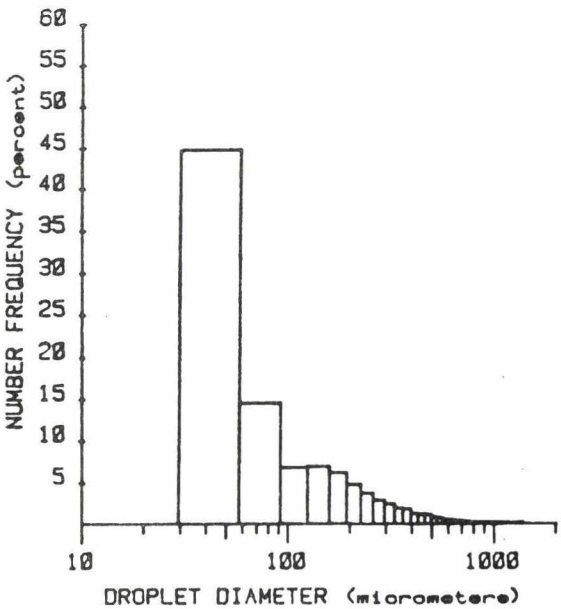
$D_{N0.1}$...	0.00 MICROMETERS	$D_{V0.1}$...	245.23 MICROMETERS
$D_{N0.5}$...	68.45 MICROMETERS	$D_{V0.5}$...	501.48 MICROMETERS R.S.... 1.3
$D_{N0.9}$...	301.34 MICROMETERS	$D_{V0.9}$...	902.93 MICROMETERS

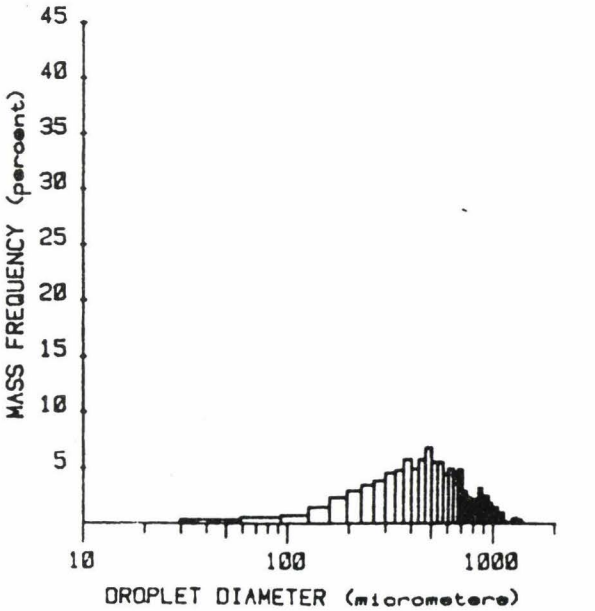
Nozzle Type.....	D8-46
Nozzle Angle Rel. to Airstream.....	0°
Spray Pressure.....	40 PSI
Airspeed.....	50 MPH
Distance to Probe...	46 cm.
Depth of Field.....	2.0 cm.
Slice Rate.....	2.0 MHz
Date.....	83/04/14
Time.....	09:49:11
File Number.....	6.0.48











D8-46,0 Degrees,40 psi,50 mph,3 oz Nalco-Trol/100 gal

DTG 84/09/24 15:07:00

DFM=2.0--1.5 MHz

UPPER LIMIT	N(RAW)	N/SEC	gm/SEC	% N	% VOL.	ACCUMULATED % N	ACCUMULATED % VOL.
56	630	1.74E 06	0.06	38.87	0.09	38.87	0.09
89	1490	510584	0.10	11.41	0.16	50.28	0.24
122	2138	315643	0.19	7.05	0.30	57.34	0.54
154	2458	383362	0.52	8.57	0.81	65.90	1.35
187	2045	325657	0.84	7.28	1.30	73.18	2.65
219	1414	222250	0.97	4.97	1.50	78.15	4.15
252	1113	167267	1.14	3.74	1.76	81.88	5.91
284	937	142425	1.43	3.18	2.21	85.07	8.11
318	790	113781	1.64	2.54	2.52	87.61	10.63
351	663	92203	1.80	2.06	2.78	89.67	13.42
382	553	77720	1.98	1.74	3.06	91.41	16.48
414	459	58197	1.92	1.30	2.96	92.71	19.43
447	404	52762	2.20	1.18	3.39	93.89	22.82
479	350	43662	2.26	0.98	3.49	94.86	26.31
512	256	30957	1.97	0.69	3.03	95.55	29.35
545	223	30115	2.32	0.67	3.58	96.23	32.92
578	166	19839	1.83	0.44	2.83	96.67	35.75
611	163	20167	2.21	0.45	3.41	97.12	39.16
644	118	15541	2.00	0.35	3.09	97.47	42.25
677	122	14634	2.20	0.33	3.39	97.80	45.64
710	102	14162	2.46	0.32	3.80	98.11	49.44
743	96	12486	2.50	0.28	3.85	98.39	53.30
776	85	12329	2.82	0.28	4.35	98.67	57.64
809	83	9202	2.39	0.21	3.69	98.87	61.33
842	76	8544	2.51	0.19	3.87	99.06	65.20
875	72	8453	2.79	0.19	4.31	99.25	69.51
908	49	5910	2.19	0.13	3.37	99.38	72.88
941	42	4788	1.98	0.11	3.05	99.49	75.93
974	45	5151	2.36	0.12	3.64	99.61	79.57
1007	34	3272	1.66	0.07	2.56	99.68	82.13
1040	24	3052	1.71	0.07	2.64	99.75	84.76
1073	21	1866	1.15	0.04	1.77	99.79	86.53
1106	24	2457	1.66	0.05	2.56	99.84	89.09
1139	9	723	0.53	0.02	0.82	99.86	89.92
1172	5	1054	0.85	0.02	1.31	99.88	91.23
1205	5	686	0.60	0.02	0.93	99.90	92.16
1238	9	2147	2.04	0.05	3.15	99.95	95.31
1271	4	321	0.33	0.01	0.51	99.95	95.82
1304	5	913	1.02	0.02	1.57	99.97	97.39
1337	2	139	0.17	0.00	0.26	99.98	97.65
1370	1	38	0.05	0.00	0.08	99.98	97.72
1403	3	511	0.71	0.01	1.10	99.99	98.82
1436	1	105	0.16	0.00	0.24	99.99	99.06
1469	1	220	0.35	0.00	0.54	100.00	99.61
1502	0	0	0.00	0.00	0.00	100.00	99.61
1535	0	0	0.00	0.00	0.00	100.00	99.61
1568	1	131	0.26	0.00	0.39	100.00	100.00
1601	0	0	0.00	0.00	0.00	100.00	100.00
TOTALS		4.47E 06	64.84				

D8-46,0 Degrees,40 psi,50 mph,3 oz Nalco-Trol/100 gal

DTG 84/09/24 15:07:00

DFM=2.0--1.5 MHz

TOTAL RAW PARTICLES.... 17291/19526-- 88.55%

NUMBER MEAN DIAMETER... 153.69 MICROMETERS S.D.... 166.31

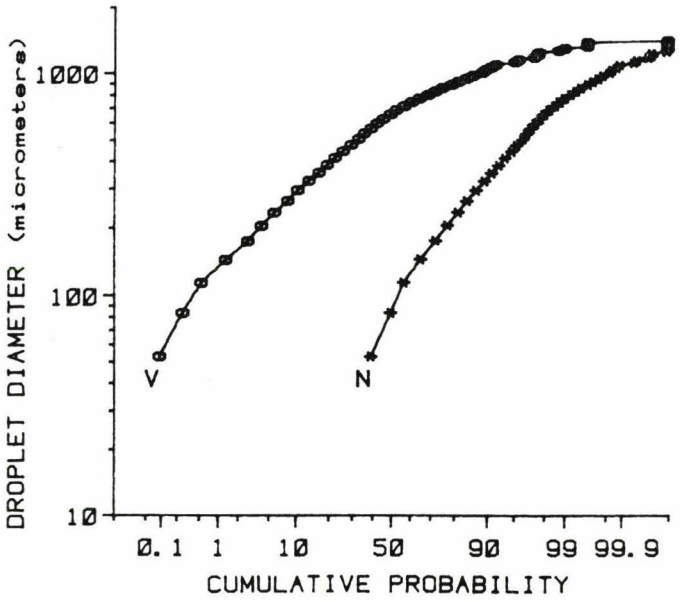
VOLUME MEAN DIAMETER... 302.59 MICROMETERS S.D.... 497.45

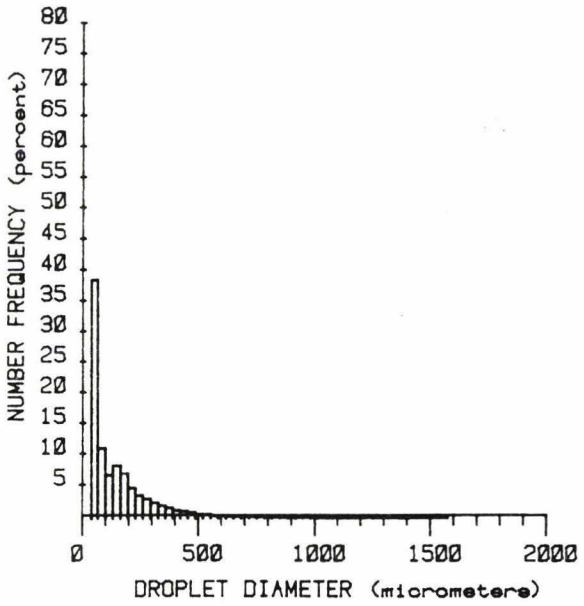
SAUTER MEAN DIAMETER... 540.27 MICROMETERS

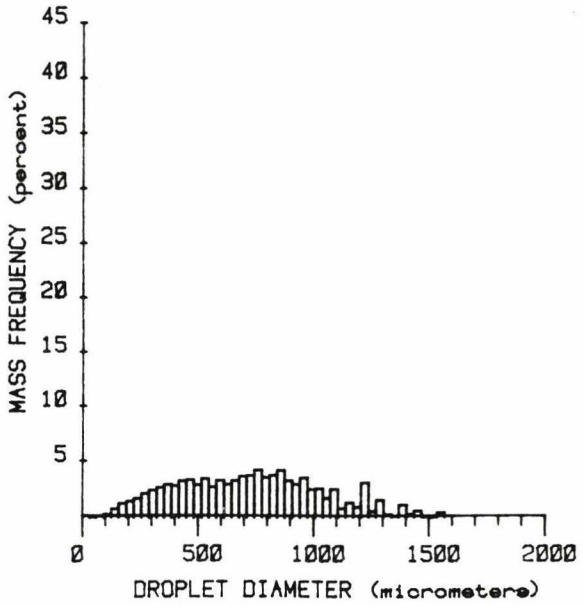
$D_{N0.1}$...	0.00 MICROMETERS	$D_{V0.1}$... 309.00 MICROMETERS	
$D_{N0.5}$...	88.45 MICROMETERS	$D_{V0.5}$... 714.27 MICROMETERS	R.S.... 1.16
$D_{N0.9}$...	357.21 MICROMETERS	$D_{V0.9}$...1140.54 MICROMETERS	

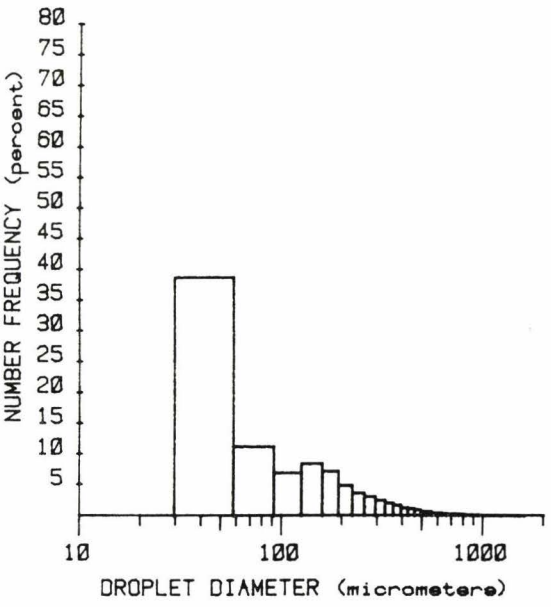
Nozzle Type..... *D8-46*
Nozzle Angle Rel.
to Airstream..... *0°*
Spray Pressure..... *40 PSI*
Airspeed..... *50 MPH*

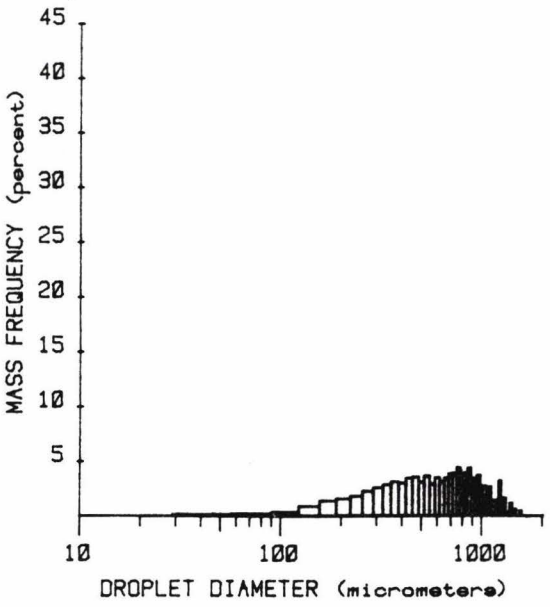
Distance to Probe... *38 cm.*
Depth of Field..... *2.0 cm.*
Slice Rate..... *1.5 MHz*
Date..... *84/09/24*
Time..... *15:07:00*
File Number..... *11.0.37*











D8-46,0 Degrees,40 psi,50 mph,6 oz Nalco-Trol/100 gal

DTG 84/09/25 13:18:00

DFM=2.0--1.5 MHz

UPPER LIMIT	N(RAW)	N/SEC	gm/SEC	% N	% VOL.	ACCUMULATED % N	ACCUMULATED % VOL.
56	282	874607	0.03	37.13	0.05	37.13	0.05
89	647	256290	0.05	10.88	0.10	48.01	0.15
122	1021	172143	0.10	7.31	0.20	55.31	0.35
154	1180	200009	0.27	8.49	0.52	63.80	0.87
187	1069	169088	0.44	7.18	0.83	70.98	1.69
219	719	113834	0.50	4.83	0.94	75.81	2.64
252	614	89333	0.61	3.79	1.15	79.61	3.79
284	510	79232	0.80	3.36	1.51	82.97	5.29
318	410	56627	0.81	2.40	1.54	85.37	6.83
351	351	49460	0.97	2.10	1.83	87.47	8.66
382	285	40243	1.03	1.71	1.94	89.18	10.61
414	257	35522	1.17	1.51	2.21	90.69	12.82
447	225	28874	1.20	1.23	2.28	91.91	15.10
479	196	27510	1.43	1.17	2.70	93.08	17.79
512	172	24386	1.55	1.04	2.93	94.12	20.73
545	154	21407	1.65	0.91	3.12	95.03	23.84
578	119	17917	1.65	0.76	3.13	95.79	26.97
611	79	10054	1.10	0.43	2.08	96.21	29.06
644	80	10350	1.33	0.44	2.52	96.65	31.58
677	71	7972	1.20	0.34	2.27	96.99	33.85
710	58	7743	1.35	0.33	2.55	97.32	36.40
743	47	7383	1.48	0.31	2.80	97.63	39.19
776	35	4364	1.00	0.19	1.89	97.82	41.08
809	32	5034	1.31	0.21	2.47	98.03	43.56
842	41	7115	2.09	0.30	3.95	98.33	47.51
875	27	4226	1.40	0.18	2.64	98.51	50.15
908	34	3896	1.44	0.17	2.73	98.68	52.88
941	32	4353	1.80	0.18	3.40	98.86	56.27
974	21	2112	0.97	0.09	1.83	98.95	58.10
1007	28	3804	1.93	0.16	3.65	99.11	61.76
1040	21	3147	1.76	0.13	3.33	99.25	65.09
1073	11	703	0.43	0.03	0.82	99.28	65.91
1106	22	5009	3.38	0.21	6.40	99.49	72.31
1139	12	1366	1.01	0.06	1.91	99.55	74.22
1172	11	837	0.67	0.04	1.28	99.58	75.49
1205	13	1862	1.63	0.08	3.09	99.66	78.58
1238	7	1187	1.13	0.05	2.14	99.71	80.72
1271	8	888	0.92	0.04	1.73	99.75	82.45
1304	6	419	0.47	0.02	0.88	99.77	83.34
1337	6	786	0.95	0.03	1.79	99.80	85.13
1370	3	363	0.47	0.02	0.89	99.82	86.02
1403	6	1375	1.91	0.06	3.62	99.88	89.64
1436	1	39	0.06	0.00	0.11	99.88	89.75
1469	5	365	0.58	0.02	1.11	99.89	90.85
1502	2	990	1.70	0.04	3.21	99.94	94.06
1535	3	1005	1.84	0.04	3.48	99.98	97.54
1568	0	0	0.00	0.00	0.00	99.98	97.54
1601	0	0	0.00	0.00	0.00	99.98	97.54
1634	0	0	0.00	0.00	0.00	99.98	97.54

D8-46,0 Degrees,40 psi,50 mph,6 oz Nalco-Trol/100 gal

DTG 84/09/25 13:18:00

DFM=2.0--1.5 MHz

UPPER LIMIT	N(RAW)	N/SEC	qm/SEC	% N	% VOL.	ACCUMULATED % N	ACCUMULATED % VOL.
1667	1	208	0.49	0.01	0.92	99.99	98.46
1700	0	0	0.00	0.00	0.00	99.99	98.46
1733	1	208	0.55	0.01	1.04	100.00	99.50
1766	1	94	0.26	0.00	0.50	100.00	100.00
1799	0	0	0.00	0.00	0.00	100.00	100.00
TOTALS		2.36E 06	52.86				

TOTAL RAW PARTICLES.... 8936/10293-- 86.82%

NUMBER MEAN DIAMETER... 168.88 MICROMETERS S.D.... 192.84

VOLUME MEAN DIAMETER... 350.09 MICROMETERS S.D.... 595.07

SAUTER MEAN DIAMETER... 652.96 MICROMETERS

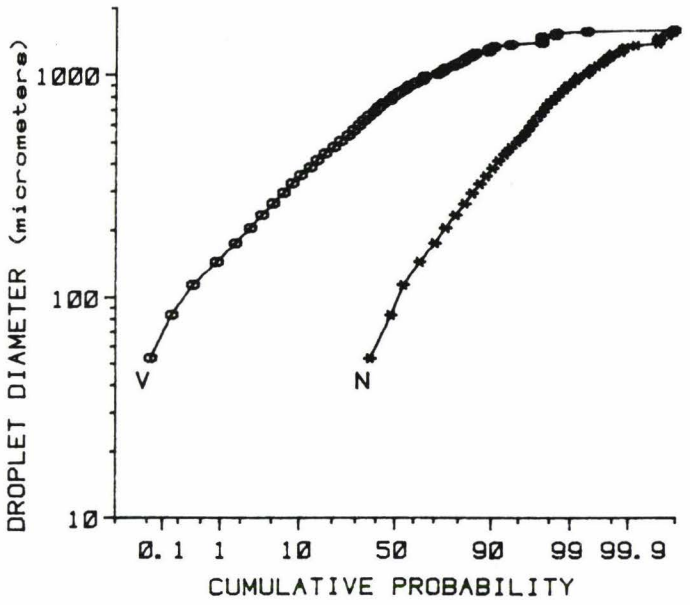
$D_{N0.1}$... 0.00 MICROMETERS $D_{V0.1}$... 373.65 MICROMETERS

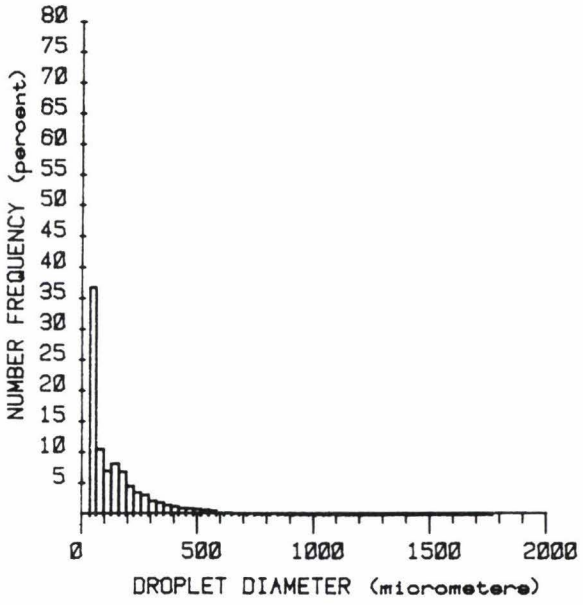
$D_{N0.5}$... 97.94 MICROMETERS $D_{V0.5}$... 872.63 MICROMETERS R.S.... 1.23

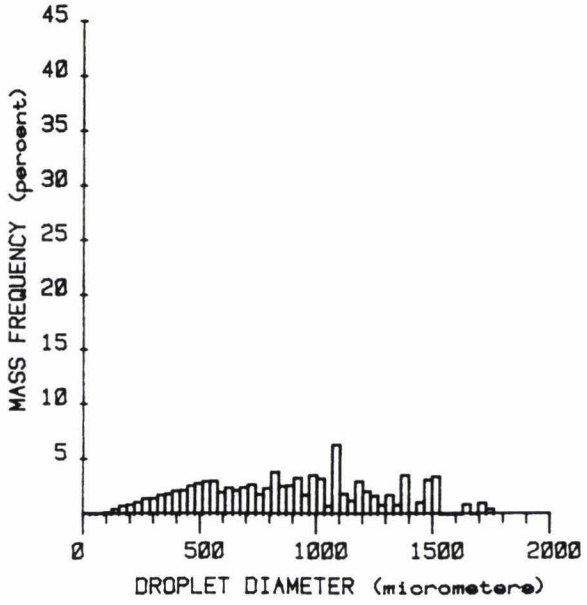
$D_{N0.9}$... 399.90 MICROMETERS $D_{V0.9}$...1443.02 MICROMETERS

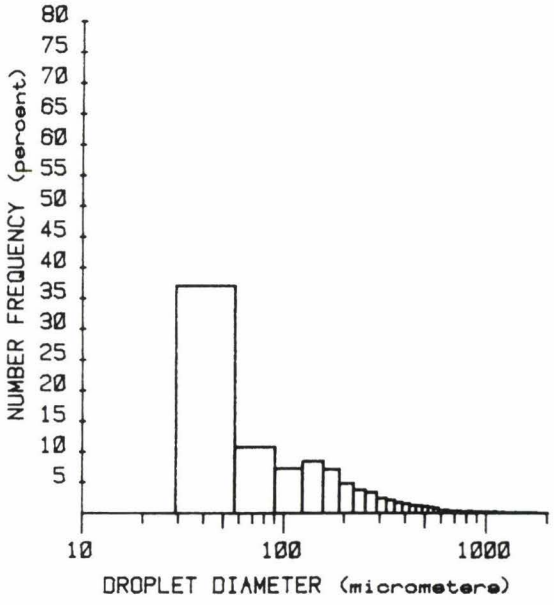
Nozzle Type..... *D8-46*
Nozzle Angle Rel.
to Airstream..... *0°*
Spray Pressure..... *40 PSI*
Airspeed..... *50 MPH*

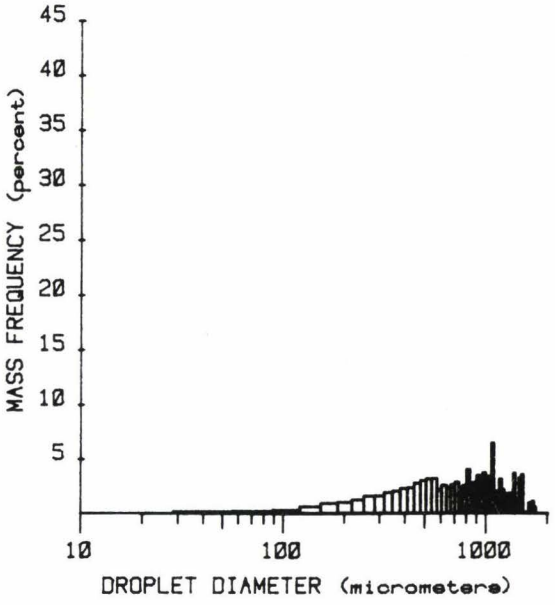
Distance to Probe... *38 cm.*
Depth of Field..... *2.0 cm.*
Slice Rate..... *1.5 MHz*
Date..... *84/09/25*
Time..... *13:18:00*
File Number..... *11.0.38*











D8-46,0 Degrees,40 psi,50 mph,9 oz Nalco-Trol/100 gal

DTG 84/09/25 08:14:00

DFM=2.0--1.5 MHz

UPPER LIMIT	N(RAW)	N/SEC	gm/SEC	% N	% VOL.	ACCUMULATED % N	ACCUMULATED % VOL.
56	272	554797	0.02	31.61	0.02	31.61	0.02
89	664	170082	0.03	9.69	0.04	41.30	0.07
122	1160	112426	0.07	6.41	0.09	47.70	0.16
154	1474	147215	0.20	8.39	0.26	56.09	0.42
187	1407	135058	0.35	7.69	0.46	63.78	0.88
219	1032	88011	0.38	5.01	0.50	68.80	1.38
252	898	79603	0.54	4.54	0.71	73.33	2.09
284	718	60423	0.61	3.44	0.79	76.78	2.88
318	674	54100	0.78	3.08	1.02	79.86	3.90
351	615	46022	0.90	2.62	1.18	82.48	5.07
382	515	37957	0.97	2.16	1.27	84.64	6.34
414	473	36249	1.19	2.07	1.56	86.71	7.90
447	414	28459	1.19	1.62	1.55	88.33	9.45
479	360	25408	1.32	1.45	1.72	89.78	11.17
512	318	21857	1.39	1.25	1.82	91.02	12.99
545	252	18242	1.40	1.04	1.84	92.06	14.82
578	227	16741	1.55	0.95	2.02	93.02	16.84
611	183	11950	1.31	0.68	1.71	93.70	18.55
644	139	9821	1.27	0.56	1.65	94.26	20.21
677	144	11102	1.67	0.63	2.18	94.89	22.39
710	130	9568	1.67	0.55	2.18	95.43	24.57
743	113	7581	1.52	0.43	1.98	95.87	26.55
776	81	6537	1.49	0.37	1.95	96.24	28.50
809	75	6863	1.78	0.39	2.33	96.63	30.83
842	64	4928	1.45	0.28	1.89	96.91	32.72
875	46	3131	1.03	0.18	1.35	97.09	34.07
908	63	4450	1.65	0.25	2.15	97.34	36.23
941	42	2738	1.13	0.16	1.48	97.50	37.70
974	46	3951	1.81	0.23	2.37	97.72	40.07
1007	40	3462	1.76	0.20	2.30	97.92	42.36
1040	34	2753	1.54	0.16	2.01	98.08	44.38
1073	45	4117	2.54	0.23	3.31	98.31	47.69
1106	36	3303	2.23	0.19	2.91	98.50	50.61
1139	40	3591	2.65	0.20	3.47	98.70	54.07
1172	24	1535	1.24	0.09	1.62	98.79	55.69
1205	23	2166	1.90	0.12	2.48	98.91	58.17
1238	30	2516	2.40	0.14	3.13	99.06	61.30
1271	18	2025	2.09	0.12	2.73	99.17	64.03
1304	18	1640	1.83	0.09	2.39	99.27	66.42
1337	18	1473	1.77	0.08	2.32	99.35	68.74
1370	9	1195	1.55	0.07	2.02	99.42	70.76
1403	15	1712	2.38	0.10	3.11	99.52	73.87
1436	10	1449	2.17	0.08	2.83	99.60	76.70
1469	11	1190	1.91	0.07	2.49	99.67	79.19
1502	5	652	1.12	0.04	1.46	99.70	80.65
1535	7	643	1.18	0.04	1.54	99.74	82.19
1568	7	561	1.09	0.03	1.43	99.77	83.62
1601	2	238	0.49	0.01	0.65	99.79	84.27
1634	3	617	1.36	0.04	1.78	99.82	86.05

D8-46,0 Degrees,40 psi,50 mph,9 oz Nalco-Trol/100 gal

DTG 84/09/25 08:14:00

DFM=2.0--1.5 MHz

UPPER LIMIT	N(RAW)	N/SEC	gm/SEC	% N	% VOL.	ACCUMULATED % N	ACCUMULATED % VOL.
1667	3	306	0.72	0.02	0.94	99.84	86.99
1700	2	443	1.10	0.03	1.44	99.86	88.43
1733	0	0	0.00	0.00	0.00	99.86	88.43
1766	3	542	1.52	0.03	1.98	99.89	90.41
1799	1	89	0.26	0.01	0.34	99.90	90.76
1832	0	0	0.00	0.00	0.00	99.90	90.76
1865	1	387	1.28	0.02	1.67	99.92	92.42
1898	0	0	0.00	0.00	0.00	99.92	92.42
1931	1	430	1.58	0.02	2.06	99.95	94.48
1964	0	0	0.00	0.00	0.00	99.95	94.48
1997	0	0	0.00	0.00	0.00	99.95	94.48
2030	0	0	0.00	0.00	0.00	99.95	94.48
2063	1	942	4.22	0.05	5.52	100.00	100.00
2096	0	0	0.00	0.00	0.00	100.00	100.00
TOTALS		1.76E 06	76.53				

TOTAL RAW PARTICLES.... 13007/14051-- 92.57%

NUMBER MEAN DIAMETER... 208.69 MICROMETERS S.D.... 241.73

VOLUME MEAN DIAMETER... 436.84 MICROMETERS S.D.... 742.00

SAUTER MEAN DIAMETER... 817.43 MICROMETERS

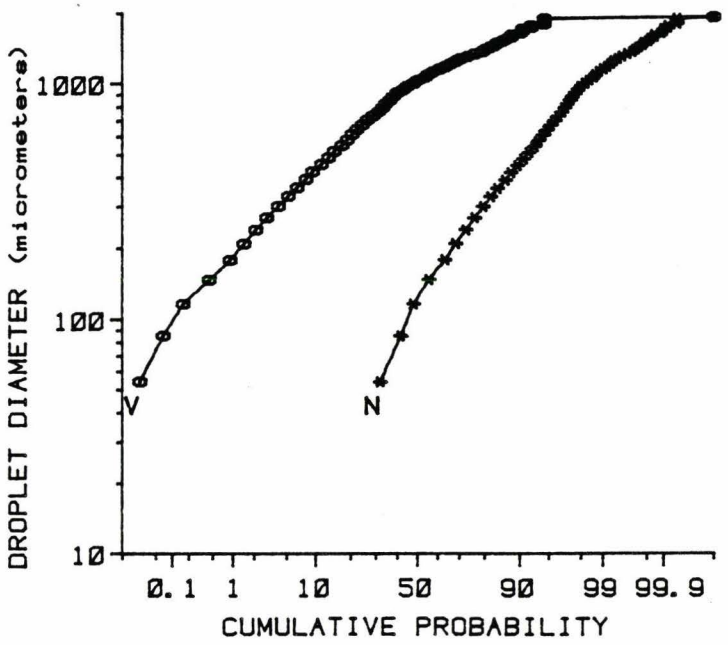
$D_{N0.1}$... 0.00 MICROMETERS $D_{V0.1}$... 457.36 MICROMETERS

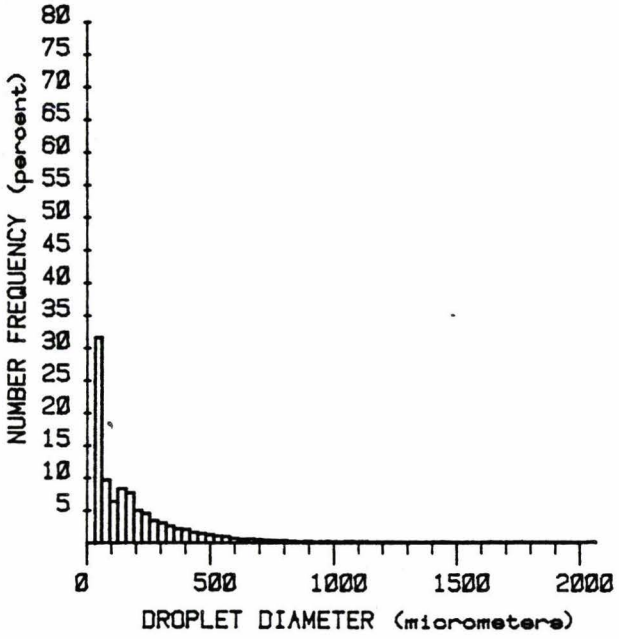
$D_{N0.5}$... 130.64 MICROMETERS $D_{V0.5}$...1098.64 MICROMETERS R.S.... 1.18

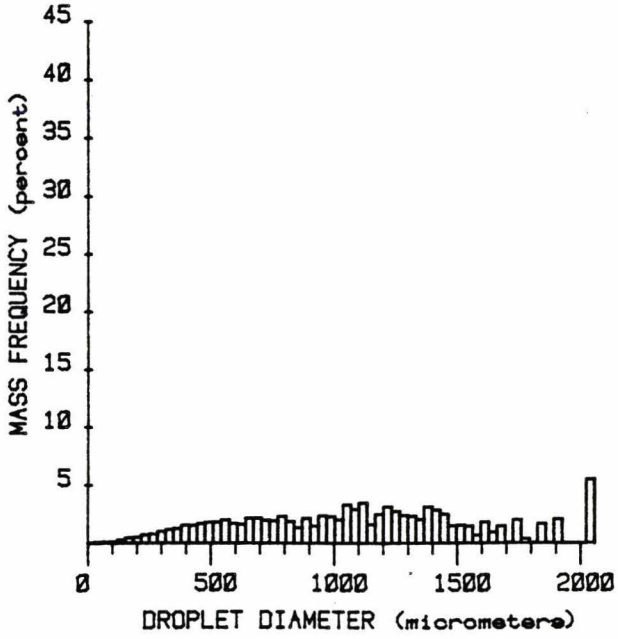
$D_{N0.9}$... 485.23 MICROMETERS $D_{V0.9}$...1758.61 MICROMETERS

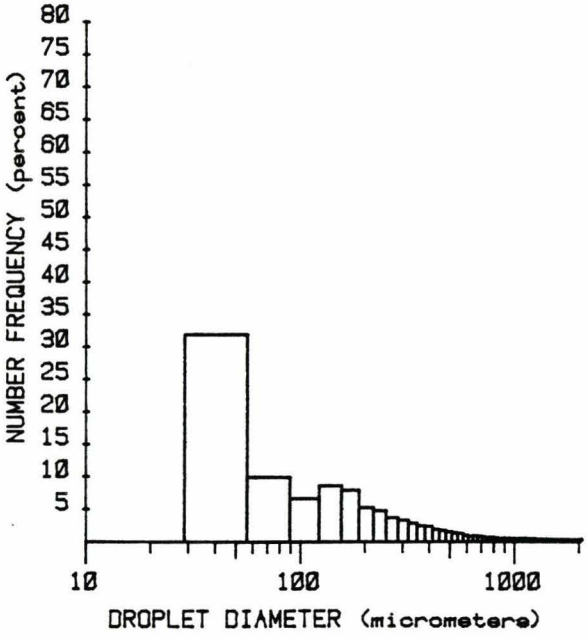
Nozzle Type..... *D8-46*
Nozzle Angle Rel.
to Airstream..... *0°*
Spray Pressure..... *40 PSI*
Airspeed..... *50 MPH*

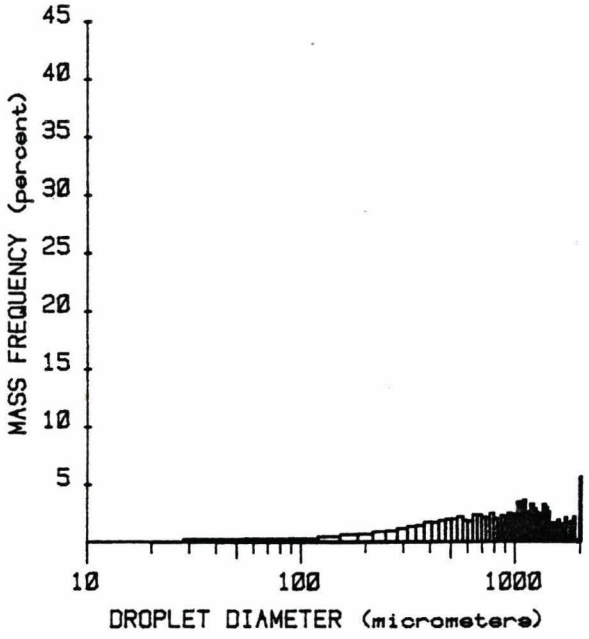
Distance to Probe... *79 cm.*
Depth of Field..... *2.0 cm.*
Slice Rate..... *1.5 MHz*
Date..... *84/09/25*
Time..... *08:14:00*
File Number..... *11.0.39*











D8-46,0 Degrees,40 psi,50 mph,12 oz Nalco-Trol/100 gal

DTG 80/09/02 13:42:00

DFM=1.0--1.5 MHz

UPPER LIMIT	N(RAW)	N/SEC	gm/SEC	% N	% VOL.	ACCUMULATED % N	ACCUMULATED % VOL.
56	647	126234	0.00	30.69	0.01	30.69	0.01
89	1445	38010	0.01	9.24	0.03	39.93	0.04
122	1543	35441	0.02	8.62	0.07	48.55	0.11
154	1288	28822	0.04	7.01	0.13	55.55	0.25
187	992	21089	0.05	5.13	0.19	60.68	0.43
219	727	15969	0.07	3.88	0.24	64.56	0.67
252	587	13614	0.09	3.31	0.31	67.87	0.98
284	480	12533	0.13	3.05	0.43	70.92	1.41
318	416	9875	0.14	2.40	0.48	73.32	1.89
351	372	10294	0.20	2.50	0.68	75.82	2.58
382	365	11229	0.29	2.73	0.97	78.55	3.55
414	294	8053	0.27	1.96	0.90	80.51	4.45
447	284	8445	0.35	2.05	1.20	82.56	5.65
479	242	8451	0.44	2.05	1.49	84.62	7.14
512	215	5997	0.38	1.46	1.29	86.07	8.43
545	186	5375	0.41	1.31	1.41	87.38	9.84
578	162	4926	0.45	1.20	1.54	88.58	11.38
611	127	3782	0.41	0.92	1.41	89.50	12.79
644	105	4156	0.54	1.01	1.82	90.51	14.61
677	113	3538	0.53	0.86	1.81	91.37	16.41
710	79	2713	0.47	0.66	1.60	92.03	18.02
743	70	1745	0.35	0.42	1.19	92.45	19.20
776	79	4590	1.05	1.12	3.56	93.57	22.77
809	54	2326	0.60	0.57	2.05	94.13	24.82
842	43	1143	0.34	0.28	1.14	94.41	25.96
875	43	2090	0.69	0.51	2.34	94.92	28.31
908	34	1838	0.68	0.45	2.31	95.37	30.62
941	34	2942	1.21	0.72	4.12	96.08	34.74
974	26	791	0.36	0.19	1.23	96.27	35.97
1007	23	709	0.36	0.17	1.22	96.45	37.19
1040	17	566	0.32	0.14	1.08	96.58	38.27
1073	18	631	0.39	0.15	1.32	96.74	39.59
1106	17	1826	1.23	0.44	4.19	97.18	43.77
1139	19	1890	1.40	0.46	4.74	97.64	48.51
1172	8	1559	1.26	0.38	4.27	98.02	52.78
1205	13	452	0.40	0.11	1.35	98.13	54.12
1238	15	623	0.59	0.15	2.01	98.28	56.14
1271	10	374	0.39	0.09	1.31	98.37	57.45
1304	9	1759	1.96	0.43	6.66	98.80	64.11
1337	11	435	0.52	0.11	1.78	98.90	65.89
1370	8	313	0.41	0.08	1.38	98.98	67.26
1403	9	392	0.55	0.10	1.85	99.08	69.12
1436	7	420	0.63	0.10	2.13	99.18	71.25
1469	4	200	0.32	0.05	1.09	99.23	72.33
1502	6	256	0.44	0.06	1.49	99.29	73.83
1535	4	354	0.65	0.09	2.20	99.38	76.02
1568	5	282	0.55	0.07	1.87	99.44	77.89
1601	1	104	0.22	0.03	0.74	99.47	78.63
1634	3	191	0.42	0.05	1.43	99.52	80.06

D8-46,0 Degrees,40 psi,50 mph,12 oz Nalco-Trol/100 gal

DTG 80/09/02 13:42:00

DFM=1.0--1.5 MHz

UPPER LIMIT	N(RAW)	N/SEC	qm/SEC	% N	% VOL.	ACCUMULATED % N	ACCUMULATED % VOL.
1667	2	193	0.45	0.05	1.54	99.56	81.61
1700	4	296	0.74	0.07	2.51	99.63	84.11
1733	4	280	0.74	0.07	2.51	99.70	86.63
1766	2	199	0.56	0.05	1.89	99.75	88.52
1799	1	113	0.33	0.03	1.13	99.78	89.65
1832	4	416	1.30	0.10	4.42	99.88	94.07
1865	0	0	0.00	0.00	0.00	99.88	94.07
1898	2	362	1.26	0.09	4.28	99.97	98.35
1931	1	132	0.49	0.03	1.65	100.00	100.00
1964	0	0	0.00	0.00	0.00	100.00	100.00
TOTALS		4.11E 05	29.45				

TOTAL RAW PARTICLES.... 11279/12736-- 88.56%

NUMBER MEAN DIAMETER... 247.73 MICROMETERS S.D.... 294.73

VOLUME MEAN DIAMETER... 515.36 MICROMETERS S.D.... 812.70

SAUTER MEAN DIAMETER... 923.37 MICROMETERS

$D_{N0.1}$... 0.00 MICROMETERS $D_{V0.1}$... 548.02 MICROMETERS

$D_{N0.5}$... 128.46 MICROMETERS $D_{V0.5}$...1150.00 MICROMETERS R.S.... 1.09

$D_{N0.9}$... 626.90 MICROMETERS $D_{V0.9}$...1801.11 MICROMETERS

Nozzle Type..... *D8-46*
Nozzle Angle Rel.
to Airstream..... *0°*
Spray Pressure..... *40 PSI*
Airspeed..... *50 MPH*

Distance to Probe... *191 cm.*
Depth of Field..... *1.0 cm.*
Slice Rate..... *1.5 MHz*
Date..... *80/09/02*
Time..... *13:42:00*
File Number..... *11.0.40*